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RESEARCH SUMMARY 1967 1969

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HORTICULTURE

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EDMONTON

On December 22, 1970, the Provincial Horticultural Station became the Alberta Horticultural Research Center, a designation which more adequately describes the work in progress, as well as the co-operative nature of a majority of the Center's projects. The suggestion of a name change originated in the Center's Advisory Committee in 1968, and was approved by both the Alberta Horticultural Advisory Committee and the Alberta Agricultural Co-ordinating Committee. In the interests of continuity with future reports, the title "Alberta Horticultural Research Center" has been used throughout this report.

ALBERTA HORTICULTURAL RESEARCH CENTER
BROOKS, ALBERTA

STAFF

Administration

A.O. Olson, B.Sc. (Agric.) (Alta.), Ph.D. (Alta.), P.Ag.	Superintendent
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E. Zibell (Mrs.)	Clerk-Typist

Farm Operations

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B. Witteveen, Cert. Heavy Duty Mech. (Alta.)	Auto Mechanic
J. McMillan	Farm Worker
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G.A. Smith, Dipl. Hort. (Ont.)	Hort. Technician
Teh-Sen Pih, B.Sc. (Agric.) (Chungshing-China), M.Sc. (Alta.)	Gardener
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Olericulture

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Pomology

S. Mahadeva, B.Sc. (Agric.) Hons. (Poona-India), M.Sc., Ph.D. (Minnesota), P.Ag.	Pomologist
W. Showalter, Dipl. (Agric.) (Olds)	Gardener
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G. Nelson	Building Superintendent
B. Bender	Janitor
W. Leighton	Janitor

INTRODUCTION

The Provincial Horticultural Station, now the Alberta Horticultural Research Center, was officially created in 1935 when the Canadian Pacific Railway's Department of Natural Resources turned its horticultural lands in the Brooks area over to the province. This area had been developed during the first world war, when the Bow River was diverted by the Bassano Dam to fill Lake Newell, which in turn supplied water over a two mile long aqueduct to irrigate these desert-like lands. As part of what was to become the Eastern Irrigation District, the C.P.R. had developed a sizable horticultural demonstration and testing farm, under the direction of A. Griffin, around its local headquarters, now the town of Brooks.

In 1953, development at the present Center's location was initiated due to the pressures of town growth. This move was completed in 1959. At present, the Center utilizes about 390 irrigable acres, at the headquarters site, the isolation station south of Brooks, and substation at the headquarters farm of the Western Irrigation District, Strathmore.

A number of persons have played very important roles in the Center's development: Mr. M.L. Freng was the first Superintendent, and on his retirement in 1943, Mr. P.D. (Dunc) Hargrave, who had come to the Center in 1936, was appointed Superintendent. Mr. Hargrave's energy and determination were the basis for the Center's development to its present size and activity. He retired in 1969, whereupon Dr. A.O. Olson was appointed to the position. Mr. P.D. McCalla, Head, Horticulture Branch, Alberta Department of Agriculture, acted as Superintendent for one year while Mr. Hargrave took educational leave at Wye College, England. One of Alberta's most prominent horticulturists, Mr. T. Kilduff, was associated with the Center as Assistant Superintendent from the early sixties until his retirement. His gladiolii collection still graces the Center's entrance.

The Alberta Horticultural Research Center is directed to promote and develop all aspects of horticulture in Alberta through co-ordinated applied research and extension programs. At the present time, four areas of horticulture are being explored in depth - olericulture, pomology, environmental horticulture, and storage physiology. The olericulture program, under the direction of Mr. S. Molnar, and the storage physiology work, developed from the Pilot Project program, and directed by Mr. T. Krahn, are necessarily closely tied together. Their objective is to aid the home gardener as well as the development of a viable commercial industry by breeding, varietal and cultural trials, and storage and quality analysis. The carrot and onion industry in the Brooks and Medicine Hat regions was developed in part from these programs. Miss D.L. Douglas is in charge of the Environmental Horticulture program: her section is directed to provide extension services to greenhouse and other commercial operators, and to the people of Alberta in the field of environmental horticulture, and to conduct applied research into all aspects of this field as it relates to both commercial and home operations. The Pomology section, under Dr. S. Mahadeva, is responsible for applied research on aspects of breeding, cultural and management practices on tree and small fruit for possible commercial production and home garden use. Very few farmsteads in Alberta need be without fruit materials because of this program.

Results from the Center's programs have previously been published as part of the Department of Agriculture's Annual Report, in the Horticultural Guide, in the Canadian Horticultural Council Report on Horticultural Research and in numerous pamphlets and mimeographs for interested groups. This report covers the last three year's experimental work, and, we hope, will allow the reader to gain a more complete picture of our program.

The Center's staff wish to acknowledge the assistance and cooperation of the Station Advisory Committee; the Canada Department of Agriculture; the Research Station, Lethbridge; the Department of Public Works; the Alberta Research Council; the Water Resources Division; the Alberta Soil and Feed Testing Laboratory; the Plant Industry Crop Clinic; the Department of Highways and the Department of Lands and Forests. Personnel from industry, universities, other sections of the Department and other research institutions have given valuable assistance, as have officers of the County of Newell, the Town of Brooks, the Eastern Irrigation District, and the Western Irrigation District.

A.O. Olson, P.Ag.
Superintendent

OLERICULTURE

Tomato Breeding Program - S. Molnar

This program is designed to develop new higher quality varieties for the fresh trade and possibly for processing in Southern Alberta or the prairies. During the last three years, four advanced Brooks seedlings were evaluated at a large number of research institutions primarily on the North American continent. Based on the cooperators' reports and on data from three years of replicated trials, two of the four seedlings were named and released in late 1969. "BV 132-2050" was named "Brookpack" and "BV-132-2109 -GTD" was released as "Brookpact".

In the 1969 growing season, 43,953 plants comprised the 816 selected lines under review. From these, 1,148 single plant selections were made. The largest number of this group came from the dwarf selections. Many selections are from crosses of advanced seedlings with paste type tomatoes and show promise of a firm, compact tomato for shipping.

Earliness is still a major requirement of the Center's breeding program. One of the many factors controlling the earliness of tomatoes is the ability to set fruit under low night temperature conditions. In other tomato growing areas, the opposite problem is present: they need a tomato which can set fruit under high temperature conditions. As cold-setting and hot-setting ability in tomatoes is controlled by the same gene, two of the new varieties were also found to be suited to extremely hot weather conditions. Over seven hundred acres were grown in 1970 in Arizona and Mexico, and to some extent in California and Texas also.

Evaluation of pH, Total Sugars and Relative Amounts of Malate and Citrate For Earliness in Tomatoes

A study of the correlation between acid content of tomatoes and the time of ripening had three major objectives: to determine the stage of fruit development that gives the most significant correlation between earliness of the tomato and changes in malic and citric acid; to determine pH, total sugar percentage, malic and citric acid content; and malic acid, citric acid ratio of tomato stocks classified as early, mid-season and late maturing under Alberta climatic conditions; and to ascertain within a population of a promising seedling, how suitable these determinations might be in selecting for earliness.

"Red Bobs", "Earlicrop" and "Starfire" were grown in the first phase of the investigation. Their fruits were harvested at seven stages of development; a detailed analysis of these three varieties suggested that changes in pH, total sugar, malic and citric acids were more useful indicators of earliness in the final fruit development stage, the green ripening stage, the early colored ripening stage, and the late colored ripening stage than in the other stages of fruit development studied.

Twenty varieties were grown in the second phase of the investigation, and were harvested at four stages of fruit development. The pH, total sugar percentage and the relationship of malic and citric acid were useful in distinguishing between early and late varieties. Koch[1] stated in his work that a shorter growing period is dependent on the presence and quantity of malic acid. The importance of malic acid to the earliness of the tomato is recognized by the author; however, this study indicates that the relationship between earliness of tomato varieties and the biochemical changes in their fruit is a more complicated matter than suggested by Koch. On the basis of results obtained, it is suggested that the following factors are important in selection for earliness in the tomato:

- an early peak in malic acid content.
- a high content of malic acid in comparison with citric acid.
- the disappearance of malic acid in the late colored ripening stage of fruit development.
- an early peak in the total of the two acids. An early peak in citric acid.
- continuous decrease in the citric acid during ripening.

Thirteen selections of a promising seedling ("BV 132 2116-3") were grown in the third test. They were harvested in four stages of fruit development. The progeny of selection "2116-3" chosen on the basis of visual earliness in 1965 showed a large variation in earliness in the 1966 season. Visual earliness (e.g. fruit color) was not a reliable method in selecting for earliness because of the human factors involved in the selection.

Although the detailed analysis of malic and citric acids were a lengthy procedure, the pattern of the acid relationship in most cases showed a reliable correlation with the actual earliness of the selections.

Pepper Breeding Program - S. Molnar

The purpose of this program is to develop early, thick fleshed, bull nose or pointed large fruited varieties for the fresh market and for greenhouse production. The first product of this program is the "Castle" variety introduced in 1968. The combination of the very good quality of the "Castle" variety with a green color is part of our present program because of the green color preference of our pepper market.

Potato Breeding Program - S. Molnar

The potato breeding program is designed to develop through breeding, testing and selection at least two varieties for the Alberta potato industry. One variety would be a replacement for the "Netted Gem", having a netted skin, scab immunity, similar appearance to the "Netted Gem", an equal storage and keeping quality, ten days earlier maturity, high yielding ability, good cooking quality, and ability to develop under adverse conditions. Suitability to some kind of processing would also be highly desirable. The early variety would be distinguished by having immunity of high resistance to scab, giving a high early yield, tuberizing as early or earlier than "Warba" being smooth with shallow eyes and possibly being a good, early chipper. In order to reach this goal, a controlled crossing program is carried out each year in the greenhouse, producing true potato seeds. The first tubers from true seed are also grwon in the greenhouse in the following summer. In addition to our own, seeds of controlled crosses from the Canadian Department of Agriculture Research Station, Fredericton, the University of Manitoba, Winnipeg, and the Aberdeen Branch Station, Aberdeen, Idaho, are also grown. A new contact was established in 1969 with the Research and Extension Center, Prosser, Washington. The cooperation with the two Northwestern American institutions look particularly promising due to the similarities of our environmental conditions and breeding aims.

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[1] Koch, B. 1962. A correlation between acid content and ripening date of the tomato fruit. Agrobotanika, 2:119-124.

Combinations were made between twelve varieties in 1969 crossing. Advanced seedlings, 426 in number were grown and from these 132 were reselected for further evaluation. Five of the advanced Brooks seedlings were included in the replicated Prairie Trials and nine seedlings in the Adaptation Trial.

Soil Heating Trial - S. Molnar

In conjunction with Calgary Power Ltd., a soil heating plot was established in 1965 using coated heating cables (a thermocouple field). These are controlled by thermostats set up to cut out at 60°F.

In 1966 the field was expanded to include a bare wire plot in which the amperage on a thirty volt circuit is governed with an electric welder. This field is referred to as a transformer field. Both wires are buried eight inches below the surface of the soil. There was no significant difference in the total consumption of electricity by the different fields.

The purpose of this trial is to increase the usable growing season for highly valuable hot weather crops such as tomatoes, peppers, eggplants, muskmelons, and cucumbers, through increasing the number of available heat units particularly early and late in the growing season.

The use of both covered and bare wires raised soil temperatures significantly. As above ground covers are necessary for early frost protection, a number of types of protection systems were evaluated. Brushing, or a wall of snow fence and heavy brown paper on the north side of the rows increased both air and soil temperature, but failed to give satisfactory protection against frost. Plastic cloches with wire supports required considerable maintenance and handling due to wind damage. Plastic cloches and plastic covered frames were discarded due to high labour requirements, wind damage and only limited frost protection. V10 titantents are not of sufficient size to allow proper plant development. P15 titantents are adequate for pepper, but they are small for tomatoes and eggplants. T20 titantents were the most satisfactory for frost protection and plant development. The use of heating cables would be of value in the production of early vegetables in a home garden and could also be of value for ornamental gardening.

Prairie Potato Trials - S. Molnar

Since 1967, a total of 29 varieties and seedlings have been tested in the five replicated Prairie Regional Trials, and forty were on trial in the four replicated Prairie Early Regional Trial. Observations included horticultural characteristics, disease resistance, culinary and quality evaluation such as boiling, baking, chipping, french-frying, specific gravity, reducing sugars and starch content. The early chipping, french-frying and main crop advanced trials, made up of three replicates of 72 varieties and seedlings were designed to produce specific information regarding one particular characteristic of the material under test. The number of varieties and seedlings tested in the Prairie Adaptation Trial was 158 in 1967, 166 in 1968, 206 in 1969 and 160 in 1970. This trial is designed for a preliminary evaluation of new seedlings and untested varieties, before entering the replicated trial. The Center also received three extra tubers of this material for an early harvest (middle of August) to determine the early potential of this material. Detailed reports of these trials are published annually in the Proceedings of the Prairie Potato Committee. Fourteen varieties and seedlings have been grown in previous years in a block trial as a final evaluation of the most promising material under commercial conditions. The "Norgold", "Norgold Russet", and "Viking" varieties were introduced through these trials.

Culinary and Quality Tests on Potatoes

One of the better techniques of determining the quality of potatoes is through culinary evaluation (boiling, baking, chipping, and french-frying).

Boiling:

Tests are done during early harvests from the main harvest, from cold storage and after reconditioning.

Baking:

Baking quality determination is not conducted from early harvests. In both boiling and baking the most important characteristics are the texture (mealiness), flavor and color. After cooking darkening is penalized in both boiling and baking tests. A pure white color is the most desirable under our Canadian conditions although a bright cream or yellow color may also be acceptable. "Netted Gem" is the standard main crop variety, while "Warba", an early variety, is used as a standard boiling quality. The following varieties have also proved to be good boilers: "Viking", "Kennebec", "Norgold Russet", "Pioneer", "Norchief", "F6087", "FS6339". The boiling standard is also "Netted Gem" even though "Norgold Russet" and "F6087" are as good.

Chipping:

The chipping industry requires a potato variety which produces good chips after cold storage (43°F) or after a short period of reconditioning. Six chipping tests are normally conducted during the growing and storing season. Color is the most important factor in the evaluations which also include crispness, lack of off-flavor, oil absorption and shelf life. In these chipping trials "Netted Gem" and "Kennebec" have been used as standards, however "F5889", "Norchip", "Avon", "F6435", "FS6650" produce better quality chips. Most varieties and seedlings chip well directly from the field, hence tests on material coming out of storage, or after reconditioning are the most important.

French-frying:

French-frying tests are gaining importance in potato evaluations due to growth in the processing industry. External color, internal color, and internal texture are the most important characteristics of this product. "Netted Gem" and "Kennebec" have been used as standards. "Cariboo", "Cascade", "Norchip", "F5889", and "FS6339" also produce very good products. "Norgold Russet" rated high, but the shelf life of the finished product was about half of the shelf life of "Netted Gem".

The reducing sugar content of a potato variety is a major factor influencing the color of the potato chips or french-fries. Variety with low percentages of reducing sugar are essential for the potato chip industry. Reducing sugar determinations are done at the time of early harvests, main harvest, from cold storage and from reconditioning by a semi-micro method, using 0.005N $Na_2S_2O_3$ as titer. The values vary from 0.050% to 1.500%; where 0.350% or lower values are usually combined with good chip color. The following material gave consistently low values: "F5208", "Norchip", "M5855-2", "F6119", and "FS6650".

Starch Tests:

Some varieties and seedlings have poor tuber characteristics or culinary quality, however are exceptionally heavy yielders. This material is tested at the end of the growing season for starch content by starch titration. "F5609" recently named as "Grand Falls" is such a starch type potato. A good starch potato should have a dry matter of 25% or higher, with a minimum of three tons of starch per acre. "Cascade", "F6212", and "FS6339" have shown consistently high starch contents.

Vegetable Varietal Trials - S. Molnar

Each year since 1967 about 600 varieties of 50 kinds of vegetables were tested for their basic horticultural characteristics, yield, disease resistance, earliness, suitability for commercial production and processing quality. Storage quality is an important factor as well, hence those vegetables which can be stored were tested in the appropriate type of storages. This report is intended to give some indication of results of tests on the more important vegetables:

Beans - Green Bush:

Two different trials were conducted; one test contained the important varieties used by the processing industry in Alberta, or varieties which have a potential for processing. These varieties must have a high yield with concentrated pod set and maturation. White seed is essential in this group although light green seeded varieties are becoming available. The development of "Blue Lake" type bush beans has been an important step forward. Table I presents information on the best ten varieties from this group.

A separate test was conducted for home garden varieties. "Tendercrop", "Topcrop", "Stringless Greenpod", "Bush Blue Lake" and "Executive" performed well.

Beans - Yellow Bush:

Sixteen varieties were tested. "Eastern Butterwax" has done very well as have "NK204" and "Midas". "Puregold", "Earliwax" and "Top Notch Golden Wax" were also reliable varieties.

Beans - Pole:

Nine varieties were grown. "Blue Lake" was consistently the best variety. "Kentucky Wonder" was the best of the broader and softer type beans and "Polaris" was the most promising new variety.

Beets:

There are a number of new varieties; "Garnet", "Ruby Queen", "Royal Red", "Mono King", "Red Pak" and "Firechief" are much better than presently recommended varieties in external and internal color, crispness and skin type.

Cabbage - Early:

Twenty-seven varieties were tested. "Stokes Early Hybrid", "Golden Acre", and "Emerald Cross" did well in every year; several new varieties, "Pacesetter F", and "Market Dawn", appear to be promising.

Cabbage - Midseason:

From the twelve varieties grown, "Market Prize", "Market Topper", "Headstart" and "Bonanza", appear to be suitable for commercial production as they have a dark green color, uniformity in size and type of head and compactness.

Cabbage - Late:

After the late cabbages were harvested, a storage trial was conducted with this material. For storage, varieties which maintain their green color for a long storage period and which can be stored with very little deterioration are necessary. "Eastern Ballhead", "Autumn Marvel", "Blue Jacket", and "Evergreen Ballhead" were acceptable till the end of December. "Houston Evergreen", "Storage Green", and "Decema" can be held even longer.

TABLE I

GREEN BEAN VARIETIES - 1967-1969

Variety	Plants Per Meter	Peduncle Habit	Pods			Yield 10 M. Kgs. Sieve Size			Yield /Acre Tons	Remarks
			Concentration	Length in cm.	Shape	2-4	5 & Over	Total		
Maestro	9	long spreading	very heavy	14	round curved	9,000	7,300	16,300	8.6	one year data
1148-SRS	14	long spreading	very heavy	13	round curved	6,810	6,710	13,520	7.1	two year data
X1DA92-4	15	long spreading	very heavy	13	round straight	7,460	5,090	12,550	6.7	two year data
Greenpod 286	15	long close	heavy	11	round straight	5,350	6,650	12,000	6.3	one year data
Valgreen	12	long close	heavy	12	round straight	7,300	4,330	11,630	6.1	two year data
Green Seeded 407	10	long close	heavy	13	round straight	7,300	4,000	11,300	6.0	one year data
Blue Bush Lake 290	11	short close	heavy	13	round curved	5,980	4,660	10,640	5.6	two year data
Bonvert	10	long spreading	heavy	13	round curved	6,330	4,330	10,600	5.6	three year data
X1DA 3919-1	15	short spreading	heavy	12	round curved	4,990	5,520	10,510	5.4	two year data
X1DA 92-7	10	short close	heavy	12	round straight	4,980	4,660	9,640	5.1	two year data

Cabbage - Savoy:

From the ten varieties, "Baby Savoy" was a good overall variety. "U-neck" was excellent because of its earliness, uniformity and potential for "once-over" harvesting. "Herba" displayed a potential for late harvesting and storage; as well, it is of small size and has a dark green color.

Cabbage - Red:

Twelve varieties were grown, "Red Debut" was the best early and "Red Pickling" the best main crop variety. "Large Blood Red" was an excellent late variety with very deep color, and a good potential for storage.

Carrots:

From the 58 varieties, the "Touchon Coreless", "Hutchinson" and "Nantes" are most suitable for early bunching or packaging. "Imperator II', "Imperator 58", "Goldpak", and "Hi-color 9" appeared suitable for storage. "Baby Fingers" was the best of the "tender-sweet" small carrots.

Cauliflower:

The best performers of the 34 varieties were "White Beauty", "Early Abundance", "Imperial", "Snow Cap", and "Dwarf Erfurt".

Corn Sweet:

Twenty-three early, 21 midseason and 61 late varieties were grown since 1967. The five best early, six best midseason and twelve best late varieties are presented in tables II and III.

Cucumbers - pickling:

New female hybrid varieties have outdated most of the older varieties. Thirty varieties were grown in the Center's trials and "Spartan Dawn", "Spartan Champion", "Briney", "Pic Nik", and "Faison" were among the better varieties of this type.

Cucumber - Slicing:

Twenty-seven varieties were grown; "Straight 8", and "Marketer" are still reliable varieties, but "Burpless", "Down East Slicer" and "Challenger" are better. If the demand for snake type cucumbers will further develop, "Groestan Super" and "Unique" will be valuable.

Lettuce - Crisphead:

From the fourteen varieties grown "Fulton", "Oswego", and "Minetto" have displayed better tip burn resistance under our conditions (high heat, low

TABLE II

SWEET CORN - EARLY AND MID-SEASON VARIETIES

	Av. Height cm.	Height to lower ear cm.	Number of			Date of Harvest	Length of ear cm.	Kernal depth	No. of rows/cob	Yield Kg.			Yield/hectare tons	Yield/acre tons
			Tillers	Nubbins	Usable ears					10 m. row	10 cobs unhusked	10 cobs husked		
Early Corn														
Polarvee	110	15	2½	2	2	5/8	18	short	13	11.9	2.3	1.6	13.09	5.3
Buttervee	120	15	3	1	2	5/8	18	med.	12	7.7	2.7	2.0	8.5	3.4
Seneca 60	130	25	3	3	1½	7/8	18	med.	12	9.8	2.7	1.9	10.7	4.3
Seneca Exp.	140	20	3	4	2	7/8	16	med.	13	11.8	2.9	2.0	13.0	5.2
Prairie Gold	145	20	4	3	2	7/8	16	short	16	11.4	2.7	2.0	12.8	5.1
Mid-Season														
Market Beauty	170	30	3	3	2	7/8	17	short	12	9.6	2.7	1.8	10.7	4.3
Golden Beauty	150	30	3	4	2	7/8	18	med.	13	7.8	3.0	2.0	8.0	3.2
Seneca Golden	170	30	3	1	2	13/8	16	good	13	13.3	3.2	2.1	14.7	5.9
Early Golden Giant	130	25	3	1	2	15/8	18	good	18	15.2	4.3	3.0	16.6	6.7
Seneca Star	180	25	3	1	2	13/8	19	good	18	12.6	4.0	2.7	13.9	5.6
E 7560	200	50	4	2	2	20/8	18	good	20	10.7	3.2	2.0	12.0	4.8

TABLE III SWEET CORN - LATE SEASON VARIETIES DATE SEEDED - MAY 9TH

			Number of					Diam. cm.				Yield Kg.						
	Average Height cm.	Height to lower ear cm.	Tillers	Nubbins	Usable ears	Date of Harvest	Length ear cm.	5 cm. from but	5 cm. from tip	Kernel depth cm.	No. rows/cob	10 m. row	10 cobs unhusked	10 cobs husked	10 cobs cut kernel	% kernel cut off to unhusked weight	Yield/hectare tons	Yield/acre tons
Queen Ann	165	20	3	1	2	15/8	17	4	3	1.0	13	10.8	2.9	1.9	1.2	41	11.9	4.0
Mellowgold	170	30	3	1	2	18/8	20	5	4	1.0	14	11.5	3.7	1.35	0.9	24	12.6	5.0
N.K. 75	140	20	2	1	2	20/8	18	4	3	1.0	13	6.7	2.5	1.7	1.0	40	7.3	2.9
Golden Beauty 66	135	20	3	2	2	15/8	14	5	4½	0.5	14	17.7	3.7	2.5	1.3	35	19.4	8.0
Exp. 6657	195	50	3	2	3	26/8	16	5	3½	0.7	21	12.3	3.6	2.5	1.5	40	13.5	5.4
E 9520	170	20	4	2	2	18/8	17	4½	4	1.0	17	21.6	3.1	1.9	1.2	38	23.6	9.4
E 9515	170	25	4	2	3	18/8	16	4	4	1.0	10	15.2	2.6	1.6	0.8	38	16.7	6.7
Hybr. 64-2160	165	15	3	2	2	18/8	20	4¼	3 3/4	0.8	14	17.2	3.2	2.1	0.7	23	18.9	7.5
Tasty Vee	140	30	5	2	3	21/8	16	4	3½	0.6	14	17.9	2.1	1.8	0.7	33	19.7	7.9
E 7560	170	15	3	1	2	18/8	18	4	3½	1.0	13	18.5	3.1	2.1	0.8	26	20.3	8.1
Early Jubilee	160	25	3	1	2	26/8	20	4	3	0.9	16	10.4	3.0	2.2	1.0	33.3	11.0	4.4
F & M Cross	170	20	4	2	2	21/8	18	5	3½	1.0	17	11.1	3.4	2.0	1.2	35	12.1	4.8

humidity) than varieties such as "Great Lakes #659", "Imperial #456", and "New York #12". "Sunblest" and the "Jack Frost" were also very promising.

Lettuce - Butterhead:

"White Boston" is still a reliable variety among the 23 varieties tested. "Buttercrunch" and "Butter King" represented a new type with a smaller head, thicker leaves, very dark green external color and yellowish cream internal color.

Muskmelon:

A very involved replicated test demonstrated that with the application of hot caps, excellent quality muskmelon fruits can be produced in the southeast part of the province. The best five varieties, with commercial potential as well as two other varieties which can be very useful in home gardens are presented in Table IV.

Onions:

From the 55 varieties on test, "Autumn Spice", "Fiesta", "Pilot", "Brown Beauty", "Pronto", "Topaz", "Premier", "Pacesetter", "Autumn Splendor", "Golden Beauty", "Hickory" and "Yellow Globe Danvers" were the best performers for commercial production. "White Barletta" and "White Pearl" displayed good potential for pickling onion production.

Parsnip:

"Harris Model" was the outstanding variety for whiteness, low sugar content, good storability, smoothness and general appearance. "All American" and "Long Smooth Hollow Crown" also showed commercial potential.

Pepper:

A concentrated evaluation was conducted on 66 pepper varieties, "Delaware Belle", "Yellow Wonder", and "Early California Wonder" were the best bullnose types. "Sunnybrook" was a good tomato type, and "Hungarian Yellow Wax" the best banana type variety. "Castle", an introduction from the Center is very early and a heavy yielder, producing a waxy yellow, thick fleshed, very juicy mild fruit. "Red Cherry" produced well among the spice varieties.

Radish:

Seventeen varieties were grown. The best nine varieties are presented in Table V with remarks added.

TABLE IV

MUSKMELON VARIETY TRIAL - THREE YEARS OBSERVATION

Variety	Shape	Size	Appearance	Flavor	Flesh	Remarks
Wheat City	round	small	yellow smooth	fair	very deep	very good home garden harvest from mid August
Maine Rock	oblong	large	ribbed netted	good	deep	commercial value, harvest late August
Sugar Salmon	round	small	ribbed netted	fair	shallow	home garden, harvest late August
Gold Star	round	large	ribbed netted	good	medium	commercial value, harvest early September
Harper Hybrid	round	large	ribbed netted	good	very deep	commercial value, harvest early September
Burpee Hybrid	round	large	ribbed netted	excellent	very deep	commercial value, harvest early September
Super Market	round	large	ribbed netted	good	deep	commercial value, harvest early September

TABLE V

RADISH VARIETIES

Variety	Shape	Color	Texture	Remarks
Cavalier	round to heart	bright red	crisp & Tender	very good appearance holds quality well
Sparkler	round to heart	red & white	crisp & tender	attractive color but doubtful commercial value holds quality well
Comet	Generally round	red	crisp & tender	attractive, holds quality well
Burpee White	beet like	white	crisp & tender	holds quality very well, doubtful commercial value
Champion	oblong	bright red	crisp & tender	holds quality well
Cherry Belle	round	bright red	crisp & tender	some variation in color, seed source would be of importance
Stoplite	heart to beet	light red	crisp & tender	maintains quality well
Scarlet Globe M.T.	oblong	red	crisp & tender	maintains quality well
Cavalronda	round to oblong	bright red	crisp & tender	maintains quality well

The varieties in the table have been grown for a number of years. "Sparkle" and "Burpee White" are good home garden varieties, however their color could be a disadvantage for commercial value. From year to year these varieties vary in growth but in general there is little difference in their development.

Successive seeding data indicates that 2½ to 3 crops may be obtained from the same plot of land. With the period of harvest running from June to October plus a storage period of three weeks. Commercial production in Alberta has had a limited success at present. Poor land preparation resulting in very weedy stands has been the limiting factor. Some of the weeds present were perennials which could have been controlled the previous year.

Radish harvesting is critical as growth is rapid and quality decreases rapidly. Market demand appears good for the grower with a continuous supply of a well graded product.

Tomato:

Intensive testing was carried out on 124 determinate and 90 indeterminate varieties. Due to the relatively short growing season in Alberta, earliness is one of the primary requirements of a usable variety. "Brookpack", "Brookpact", "Earlicrop", "Manitoba", "Scotia", "Alpha #7", and "Early Fireball" varieties have done very well in the southeastern part of the province, whereas "Rocket" and "Red Bobs" are recommended for the central part of the province. "Moreton Hybrid" and "Hybrid Red #22" were the best staking tomato varieties.

Freezing Tests:

A number of kinds of vegetables are processed after harvest and evaluation for freezing tests each year. The frozen packages were stored for six months, after which the produce was prepared and evaluated by a five member taste panel. The cooked product was judged on the basis of color, form, texture of skin and flesh, and flavor. Each variety was tested for three years and the scores obtained were compared with the levels of standard varieties in the same maturity range. The data obtained is of value in making recommendations for the Alberta Horticultural Guide, as well as for commercial processors or growers.

HERBICIDE TRIALS

Potato Vine Killer Studies - Dr. S. Mahadeva

A preliminary replicated trial was planted on May 17, 1968 using the Netted Gem variety of potatoes. They were planted in a silt loam soil at a spacing of 36 inches between rows and 12 inches between plants in the row. The vine killing chemicals sprayed included three concentrations each of Cyanamid liquid, Diquat, Paraquat, sodium arsenite and Des-I-Cate sprayed on three dates corresponding to three stages of crop maturity. In addition to the chemical sprays, simulated rotobeater and check treatments were also included. In 1969, the same variety of potatoes was planted on May 14th. All the treatments in 1968, except Des-I-Cate which was replaced with Sinox, were used in 1969. Only two concentrations of each chemical were studied in 1969 with additional split application treatments of the lower concentrations of all the chemicals. In 1969, the chemicals were sprayed on two dates corresponding to two stages of crop maturity. All spraying was done with a "Solo" Knapsack sprayer at a pressure of thirty pounds per square inch and at forty gallons spray per acre.

The effects of the treatments on the rate and completeness of vine kill, yield of tubers, marketable percentage of tubers, stem-end vascular discoloration, bruising of tubers, specific gravity, sprouting ability after storage, culinary quality characteristics such as boiling and chipping, reducing sugar and starch content were determined.

Rate of Vine Kill:

At low rates of chemical sprays, the more mature the vines at spraying time, the greater was the rate of vine kill in the first five to six days. At higher rates of spraying the maturity of the vines appeared to make very little difference on the rate and completeness of vine kill. Generally, there was a tendency for the split application of the lower concentrations to be lower in the rate and completeness of vine kill compared to the same concentration as a single spray. Paraquat and Diquat at higher concentrations gave over ninety percent vine kill at harvest. Their rate of vine kill was rapid.

Yield of Tubers:

In general, chemical vine killing resulted in lower yields compared to the unsprayed check treatment. This tendency for lower yields was especially pronounced in the vine killing sprays at the earlier stages of crop maturity. The rotobeater treatments reduced yields very drastically.

Marketable Percentage of Tubers:

The marketable percentage of tubers did not show any appreciable difference as a result of the vine killing treatments.

Specific Gravity:

The unsprayed treatment had a very high specific gravity reading while the rotobeater treatment at the earlier stages of crop maturity resulted in very low readings. Rotobeating closer to full crop maturity improved the specific gravity readings. The high concentrations of spray, which led to a fast rate of vine kill, resulted in a lowering of the specific gravity of tubers.

Bruising of Tubers:

All early spray treatments appeared to reduce the extent of skin bruising compared to the unsprayed. It was interesting to note that the rotobeater treatment resulted in the lowest amount of skin bruising.

Stem-end Vascular Discoloration:

In 1968 high rates of chemicals tended to show very slight vascular discoloration in a few tubers. In 1969 the discoloration was minimal.

Cooking Quality Test:

Higher rates of chemical sprays and rotobeating lowered the cooking quality scores compared to the same treatment at the lower rates, or the checks.

Chipping Quality:

Rotobeater treatment resulted in poor chipping quality scores. The higher concentrations of spray also resulted in low scores compared to the scores resulting from sprays at lower concentrations.

Sprouting Ability After Storage:

Sprouting ability tests were carried out on the 1968 crop after eight months of storage. The results indicated no differences in sprouting ability between the vine killing chemical spray treatments and the unsprayed.

Preliminary Studies on Potato Weed Control - Dr. S. Mahadeva and R.A. Reesor

A preliminary field trial was carried out at the Alberta Horticultural Research Center, Brooks, Alberta, to study the effects of some chemicals to control weeds in potatoes. A three replicated, randomized block field design was used in this study. Seed pieces of the "Netted Gem" variety were planted on May 14, 1969 at a spacing of three feet between rows and one foot between plants in the row. Each plot was fifteen feet long. The crop was harvested on September 18, 1969.

The following chemicals were sprayed on May 27, 1969, as pre-emergence treatments: Dalapon at 10 pounds (product), Linuron at 1 and 2 pounds active ingredient (A.I.) and Prometryne at 2 and 2½ pounds (A.I.). Paraquat at ½, 3/4 and 1 pound A.I. was sprayed as an early post-emergence treatment on June 11, 1969 when about ten to thirty percent of the crop had emerged. Other treatments included hand weeding and unweeded checks. All spraying was done with a "Solo" knapsack sprayer at thirty pounds p.s.i. and at forty gallons of spray per acre. The dominant weeds among the broad-leaved types were Lamb's quarter, red-root pigweed, kochia, mustard, and Russian thistle, while green foxtail was the dominant grass weed. The results of the 1969 trial are based on arithmetic means. Weed control and crop injury ratings range from 1 (no kill) to 10 (complete kill).

Table I presents the effect of treatments on extent of weed control and crop injury as observed on three dates. As anticipated, Dalapon at 10 pounds gave excellent control of grasses but not of broad leaved weeds, while Linuron at 2 pounds controlled about fifty-five to sixty-five percent of the broad leaved weeds and over sixty percent of the grasses. Linuron at 1 pound appeared to be not as effective in controlling weeds as at the higher concentration. Prometryne at 2½ pounds controlled over ninety percent of the broad leaved weeds and also over ninety percent of the grasses when observed about six weeks after spraying. Prometryne at the lower concentration of 2 pounds showed initial excellent control of both broad leaved weeds and grasses as observed on June 16 (about 20 days after spraying). However, its effectiveness in controlling weeds appeared to diminish after that date. Paraquat as an early post-emergence application at all concentrations completely killed all weeds for about two weeks. After this period of time the extent of control by Paraquat was not satisfactory.

Crop injury ratings resulting from the chemical weed control sprays indicated that Prometryne at 2½ pounds showed slight crop injury about one month after spray and further injury one and one-half weeks later. Paraquat injured the crop quite severely when observed five days after spraying. However, the crop recovered very well by June 26, 1969. All other treatments did not injure the crop.

Yield, marketable percentage of tubers and specific gravity readings are presented in Table 2. Dalapon at 10 pounds and Paraquat at 1 pound depressed yields below the hand weeded check. The unweeded plots drastically reduced yields. The marketable percentage of tubers compared to the hand weeded check was much lower with the Dalapon and Paraquat treatments. Generally the specific gravity of the tubers was not adversely affected by the treatments.

Linuron at 2 pounds and Prometryne at 2½ pounds show promise for weed control in potatoes. Further studies are planned during the 1970 growing season.

TABLE I

EFFECT OF PRE-EMERGENCE CHEMICAL SPRAYS ON RATINGS OF BROAD-LEAF, GRASS WEED CONTROL, AND CROP INJURY IN NETTED GEM POTATOES, BROOKS, 1969

		Sprayed 27/5/69 and Observed on								
		Broad Leafed Weed Control			Grass Weed Control			Crop Injury		
Treatments		16/6	26/6	7/7	16/6	26/6	7/7	16/6	26/6	7/7
Dalapon	10 pounds	1.3	1.3	1.3	10.0	9.3	9.7	1.0	1.0	1.0
Linuron	1 pound	5.0	2.3	2.3	4.3	2.7	2.7	1.0	1.0	1.0
Linuron	2 pounds	5.3	5.3	6.2	6.0	5.0	7.0	1.3	1.0	1.0
Prometryne	2 pounds	9.3	3.7	6.0	6.7	3.0	5.8	1.0	1.0	1.0
Prometryne	2½ pounds	9.7	8.3	9.2	6.7	7.7	9.2	1.0	1.7	2.0
Paraquat	½ pound	10.0	2.3	1.0	10.0	2.3	1.0	5.3	1.0	1.7
Paraquat	3/4 pound	10.0	1.0	1.0	10.0	1.0	1.0	3.0	1.0	1.0
Paraquat	1 pound	10.0	2.7	3.0	10.0	2.7	3.0	5.3	1.0	1.3
Hand Weeded		10.0	10.0	10.0	10.0	10.0	10.0	1.0	1.0	1.0
Unweeded		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

All chemicals except Dalapon are shown as Active Ingredients per acre.

Legend: 1 = no control or kill
10 = complete control or kill

TABLE 2

EFFECT OF PRE-EMERGENCE CHEMICAL WEED CONTROL TREATMENTS ON TOTAL YIELD, MARKETABLE PERCENTAGE AND SPECIFIC GRAVITY OF "NETTED GEM" POTATOES, BROOKS, 1969

Treatments		Total Yield Kg.	Marketable Per Cent	Specific Gravity
Dalapon	10 pounds	8.3	58.2	1.102
Linuron	1 pound	11.8	74.6	1.095
Linuron	2 pounds	13.2	71.8	1.090
Prometryne	2 pounds	13.2	72.3	1.098
Prometryne	2½ pounds	10.8	76.1	1.103
Paraquat	½ pound	10.7	55.0	1.099
Paraquat	3/4 pound	13.1	67.5	1.105
Paraquat	1 pound	7.9	60.4	1.099
Hand Weeded		10.1	75.0	1.107
Unweeded		6.5	62.6	1.095

All chemicals except Dalapon are shown as Active Ingredients per acre.

Post-Emergence Herbicide Trials on "Fiesta" Variety of Onions on Chin Silt Loam Soil - R.A. Reesor and H. Koga

A series of post-emergence herbicide treatments were applied at the rate of forty gallons of water per acre at low pressure. The main weed species were lady's thumb, red root pigweed, lamb's quarter, and green foxtail. Results were rated as follows in Tables 3 and 4:

TABLE 3

Treatment and Rate Per Acre	Date of Application	Stage of Crop Growth	Weed Control	Crop Injury	Remarks
Linuron (.5 lb. A.I.)	June 21	loop to flag	6	2	tipburn
Linuron (.5 lb. A.I.)	June 31 & July 5	loop to flag 2nd & 3rd leaf	6	4	
Linuron (.5 lb. A.I.)	June 27	flag to 1st leaf	5	2	tipburn
Linuron (.5 lb. A.I.	July 5	2nd to 3rd leaf	3	2	tipburn
Linuron (1 lb. A.I.)	June 21	loop to flag	9	7	
Linuron (1 lb. A.I.)	June 21 & July 5	loop to flag 2nd & 3rd leaf	9	7	
Linuron (1 lb. A.I.)	June 27		8	5	
Linuron (1 lb. A.I.)	July 5		7	5	
Linuron (1½ lb. A.I.)	June 21		10	9	
Linuron (1½ lb. A.I.)	June 27		10	8	
Linuron (1½ lb. A.I.	July 5		9	7	

A.I. = Active Ingredient

Linuron at ½ pound A.I. resulted in unsatisfactory weed control. Early application at 1 pound resulted in severe damage at the flag leaf stage. Damage was reduced as plants developed.

In general the plants did not grow normally; considerable stunted growth resulted from the treatments.

TABLE 4

Treatment and Rate Per Acre	Date of Application	Stage of Crop Growth	Weed Control	Crop Injury	Remarks
Nitrofen (2 pts.)	June 21	loop to flag	3.5	0	
Nitrofen (2 pts.)	June 21 & July 5	loop to flag 2nd & 3rd leaf	4.5	0	
Nitrofen (2 pts.)	June 27	flag & 1st leaf	5.0	1.0	slight tip burn
Nitrofen (2 pts.)	July 5	2nd to 3rd leaf	slight suppression	1.0	slight tip burn
Nitrofen (4 pts.)	June 21	loop to flag	8.5	1.0	slight tip burn
Nitrofen (4 pts.)	June 21 & July 5	loop to flag 2nd and 3rd leaf	8.5	1.0	slight tip burn
Nitrofen (4 pts.)	June 27	flag to 1st leaf	8.5	1.0	slight tip burn
Nitrofen (4 pts.)	June 27 & July 19	flag to 1st leaf 3rd to 4th leaf	9.5	1.0	slight tip burn
Nitrofen (4 pts.)	July 5	2nd to 3rd leaf	partial top kill	0	
Nitrofen (6 pts.)	June 21	loop to flag	9.0	3.5	25% onion burned off to ground level
Nitrofen (6 pts.)	June 21 & July 19	loop to flag 3rd to 4th leaf	9.0	4.0	
Nitrofen (6 pts.)	June 27	flag to 1st leaf	9.0	2.5	tip burn
Nitrofen (6 pts.)	July 5	2nd to 3rd leaf	severe stunting	1.5	tip burn
Nitrofen (8 pts.)	June 21 & July 19	loop to flag 3rd to 4th leaf	9.5	5.0	tip burn
Notrofen (8 pts.)	June 27	flag to 1st leaf	9.0	3.0	crinkling of leaves
Nitrofen (8 pts.)	July 5	2nd to 3rd leaf	severe stunting	1.0	

Growing conditions were excellent except for the July 5th application when the field was quite dry. Very satisfactory weed control was obtained from the four pint rate of application. Weeds of the Brassicae family are resistant to nitrofen. The crop grew out of most of the injury due to nitrofen.

Carrot and Parsnip Herbicide Trials - R.A. Reesor

Linuron applied as a general weed control chemical caused damage to the crop after irrigation. Damage was more pronounced in the variety "Hicolor" while "Imperator II" showed resistance to spray damage.

Tomato and Celery Herbicide Trials - R.A. Reesor

Solan at 1 gallon per acre gave very satisfactory weed control in these crops. It is important that this herbicide be sprayed at the proper time - when the weeds are in active growth.

Turnip Herbicide Trials - R.A. Reesor

Post-emergence application of Tok E at 6 pints per acre resulted in a sixty percent weed kill. This moderate weed kill can be attributed to poor timing of spraying. Dry conditions necessitated irrigation and by the time spraying could be done the weeds were past their susceptible stage.

Screening Trial With Herbicides - R.A. Reesor

A screening trial using promising chemicals for weed control is carried out every year. Thirteen kinds of locally grown vegetables were studied in 1968. The major weeds growing were lady's thumb, green foxtail, red root pigweed, mustard, and lamb's quarter. Some of the important observations are as follows:

- Dacthal at 16.20 pounds A.I. (active ingredient) did not give satisfactory weed control.
- Dymid at 3 pounds A.I. and Patoran at 3 pounds A.I. gave good weed control with limited crop tolerance.
- Trifluralin at 1 pound A.I. did not result in effective weed control.
- TD 480 at 6 pounds A.I. was unsatisfactory.
- CP 31393 at 10 pounds A.I. controlled seedling grasses well.
- Rowmate at 8 pounds A.I. was not as satisfactory as in 1967.
- TOK E at 4 pounds A.I. had no value as a pre-emergent herbicide.

- Linuron at 3 pounds A.I. as an incorporated treatment increased effectiveness of weed control.
- Tenoran at 3 pounds was slower in action but appears to have a longer residual control than linuron.

SPECIAL CROPS SECTION

Pilot Vegetable Projects, 1969 - T.R. Krahn

Cabbage Varietal Trials

The following six varieties were grown under this trial: "Stokes Early Hybrid:, "Baby Head", "Market Prize", "Market Topper", "Head Start", and "Emerald Cross". These varieties were grown from transplants and subsequently evaluated as to size and market acceptability. The objective of this project is to establish a continuing flow of fresh market cabbage out of the field to the wholesale trade. This is essential for continuity of supply and thus capture of a major section of the cabbage market at that period of the year. Without such a continuous succession of varieties it is almost impossible to supply cabbage from early in July until such time as storage cabbage is available. The varieties "Stokes Early Hybrid", "Head Start" and "Emerald Cross" proved to be readily adaptable to continuous harvesting. The varieties "Market Prize" and "Market Topper" tended to be slightly oversized for continuous harvesting.

Cabbage Storage Trial

Four varieties, "Eastern Ballhead", "Quaker State Ballhead", "Autumn Marvel", and "Storage Green", and two or three varietal trial cabbages including "Blue Jacket" and "Decema" were placed into the high humidity control temperature storage (Filacell) late in September. The storage of cabbage has always been a major concern to the producers of this commodity in Alberta: up until now all the cabbage has been stored in common root cellars, which allows the producer to keep his crop only until early December and never past the new year. At the same time they normally experienced a large percentage of loss due to decay and the quality loss due to lack of color in the marketed product. It is part of the objective of this trial to provide a more suitable environment for cabbage storage. From early indications it is apparent that the high humidity and controlled temperature storage is going to be very beneficial in providing a excellent product to the retail trade in the early part of the new year. All the varieties put into storage were evaluated and trimmed in January. The varieties "Decema", "Blue Jacket", "Autumn Marvel" and "Houston Evergreen" were retained at that time. From visual observations, the storage period will be reaching its end early in May.

Celery

The objective of the celery trial was to put material into storage for the early winter market. Two varieties, "Hybrid Green" and "Utah 15", were grown. These two varieties in 1969 did not mature as well as normally expected. Storage in the high humidity and controlled temperature conditions was not sufficient to keep this product more than two or three weeks.

Sauerkraut Cabbage Varietal Trial

Several varieties were both transplanted and direct seeded to determine their adaptability for sauerkraut usage. Unfortunately, these varieties were not evaluated by the cooperating agency, Bicks of Canada. The results from this trial are therefore inconclusive.

Carrots

Two varieties, "High Colour 9" and "Imperator 11", were seeded to provide material for storage research. The carrots were stored in individual pallet boxes with different chemical treatments applied to each of the boxes. Carrots were graded on April 9th and 10th, 1970. Total losses, averaged over all treatments, was 9.45 percent, of which soft rot caused a 3.67 percent loss. There was no difinite indication that one treatment was better than another.

Progress Report - Sweet Corn Cultural Project - Fall 1969

A project to improve the yield and quality of commercial sweet corn was undertaken at the request of processed corn growers in Alberta in the spring of 1969. The Alberta Agricultural Research Trust Fund was approached, and this project was approved for study, under Dr. W.T. Andrew, University of Alberta.

To coordinate the project, which was established in Southern Alberta on land rented from a local farmer, a committee consisting of Dr. W.E. Torfason, Research Station, Lethbridge, R.M. Trimmer, Alberta Department of Agriculture Lethbridge, and T.R. Krahn, Special Crops Supervisor, was set up.

Sweet corn of the variety "Queen Anne" was seeded in two commercial sized fields on May 7th. One plot of approximately ten acres was used for the fertilizer study, and the other of about seven acres was intended for an irrigation study.

The project was designed to be a demonstration as well as research plot to indicate the optimum fertility and moisture levels for corn production to the growers. To achieve the above objectives, fertility and irrigation treatments were administered at five different levels.

Fertilizer treatments applied as a side dressing on June 10th were as follows:

(1) Soil Sample Recommendations

Example 110 pounds 34-0-0
75 pounds 11-48-0

(2) Half Soil Sample Recommendation

Example 55 pounds 34-0-0
37.5 pounds 11-48-0

(3) 1½ Soil Sample Recommendation

Example 165 pounds 34-0-0
112.5 pounds 11-48-0

(4) Double Soil Sample Recommendations

Example 220 pounds 34-0-0
150 pounds 11-48-0

(5) Check

Example No Fertilizer added.

Proposed irrigation treatments, according to tensiometers, were as follows:

1. Irrigate at twenty-five percent available moisture.
2. Irrigate at fifty percent available moisture.
3. Irrigate at seventy-five percent available moisture.
4. Irrigate to maintain at fifty percent to silking time and then discontinue.
5. Delay first irrigation until crop is two feet high and then maintain at fifty percent for balance of season.

Each fertilizer and irrigation treatment was done in two replications. Each treatment was eight rows in width. Technical data would be taken from the middle four rows; the size of each treatment was such as to facilitate mechanical harvesting. Data taken on each treatment included the following:

1. Seed drop per yard (to attain a good stand of corn there should be at least five seeds per yard) - our seed drop averaged 4.7 to 5.2 seeds per yard.
2. Date of eighty percent emergence - was not recorded in most cases.
3. Weedly growth measurements were taken. Corn growth was very much slower than normal. No difference was noted between fertilizer treatments.

Unfortunately due to conditions of weather and other uncontrollable factors, a very poor and spotty germination and emergence was achieved. The plant stand, (an average of sixty to seventy percent) was such that reliable yield could not be recorded. It was therefore decided by all parties involved that the project be formally discontinued on July 15th.

The following visual observations are presented:

1. The size of project undertaken this year is too dependent on weather conditions, and the risk involved probably suggests a modified plot lay out in the future.

(2) Irrigation treatments could not be carried out because of the abundance of rainfall at the Barnwell plot.

(3) Without yield data, there was no apparent difference in fertilizer treatments.

The above observations were substantiated by the relatively poor corn crop across Southern Alberta.

We believe that there is a sufficient grower interest to continue with this study during 1970, possibly with a more research orientated plot layout.

The efficient use of fertilizer and irrigation practices which will be established through this project, should allow growers to produce more tons per acre and per dollar invested.

Processing Green Pea Study - 1969

Introduction

The objectives of the study for 1969 were as follows:

(1) To study two varieties of processing peas, one early variety and one late variety.

(2) To evaluate each variety at different stages of maturity to determine their yielding ability.

(3) To determine the accuracy of such a study, by comparing it to the commercial sized trial being conducted by the Canada Department of Agriculture, Research Station, Lethbridge.

(4) To gain information on the accuracy of single tenderometer readings.

Fields were selected in the Vauxhall area in Alberta, with the cooperation of the Processing Industry. To gather the necessary data a man was dispatched to these fields on consecutive days and was instructed to sample them at random. A ten square yard sample was removed each day and transported to the Alberta Horticultural Research Center for processing.

Data Taken

Following is an outline of the data established from each sample and presented in Table I.

TABLE I

Sampling Date	Variety	Wt.of Vines Lbs.	Wt. of Shelled Peas Lbs.	Ratio Vines/ Peas	Tenderometer Composite Sample	Tenderometer Sieve Sizes Average	Tenderometer and Sieve Size (%) Distribution										Yield Tons/ Acre	% Waste
							2		3		4		5		6			
							T.R.	%	T.R.	%	T.R.	%	T.R.	%	T.R.	%		
28/6	144	68.2	6.6	10.33:1	77	77	66	-	77	-	90.97	-	-	-	-	-	1.04	35.0*
29/6	144	51.26	5.17	9.9:1	74	73	66	26.11	78	28.04	93	13.54	-	-	-	-	.90	32.30
30/6	144	89.1	7.6	12.73:1	77	78	67	26.97	84	31.84	93	11.84	-	-	-	-	1.31	29.34
12/8	144	67.91	12.51	5.43:1	82	77	65	5.68	74	18.39	78	29.58	85	30.38	96	9.59	2.84	6.39
13/8	144	73.31	13.61	5.39:1	88	86	65	5.14	71	11.76	82	26.45	94	35.27	116	16.16	3.12	5.22
14/8	144	72.9	14.31	5.09:1	87	86	68	2.80	75	10.48	81	23.76	89	39.13	110	29.27	3.33	3.56
15/8	144	69.36	14.49	4.79:1	90	92	73	4.90	74	9.80	86	13.87	95	38.79	115	32.64	3.51	-

* - estimated figure

Financial Returns

June 28

Total

1.04 tons @ $151.00/ton	$157.04
Less Harvesting Cost 1.04 @ $18.00/ton	18.72
RETURN	$138.32

June 29

Breakdown

Sieve #2 0.35 tons @ $151.00/ton	52.85
Sieve #3 0.37 tons @ $151.00/ton	55.81
Sieve #4 0.18 tons @ $119.00/ton	21.42
	$120.08
Less Harvesting Cost (0.90 tons @ $18/ton)	16.20
RETURN	$103.88

Total

0.90 tons @ $151.00/ton	135.90
Less Harvesting Cost (0.90 tons @ $18/ton)	16.20
RETURN	$119.70

June 30

Breakdown

Sieve #2 0.50 tons @ $151.00/ton	55.50
Sieve #3 0.59 tons @ $151.00/ton	89.09
Sieve #4 0.22 tons @ $119.00/ton	26.18
	$170.77
Less Harvesting Cost (1.31 tons @ $18/ton)	23.58
RETURN	$147.19

Total

1.31 tons @ $151.00/ton	197.81
Less Harvesting Cost (1.31 tons @ $18/ton)	23.58
RETURN	$174.23

August 12

Breakdown

Sieve #2 0.17 tons @ $134.00/ton	$ 22.78
Sieve #3 0.56 tons @ $134.00/ton	75.04
Sieve #4 0.90 tons @ $134.00/ton	120.60
Sieve #5 0.92 tons @ $120.00/ton	110.40
Sieve #6 0.29 tons @ $100.00/ton	29.00
	$357.82
Less Harvesting Cost (2.84 tons @ $18/ton)	51.12
RETURN	$306.70

Total

2.84 tons @ $134.00/ton	380.56
Less Harvesting Cost (2.84 tons @ $18/ton)	51.12
RETURN	$329.44

August 13

Breakdown

Sieve #2 0.17 tons @ $134.00/ton	22.78
Sieve #3 0.39 tons @ $134.00/ton	52.26
Sieve #4 0.87 tons @ $134.00/ton	116.28
Sieve #5 1.16 tons @ $108.00/ton	125.28
Sieve #6 0.53 tons @ $ 74.00/ton	39.22
	$356.12
Less Harvesting Cost (3.12 tons @ $18/ton)	56.16
RETURN	$299.96

Total

3.12 tons @ $120.00/ton	374.40
Less Harvesting Cost (3.12 tons @ $18/ton)	56.16
RETURN	$318.24

August 14

Breakdown

Sieve #2 0.10 tons @ $134.00/ton	$ 13.40
Sieve #3 0.36 tons @ $134.00/ton	48.24
Sieve #4 0.82 tons @ $134.00/ton	109.88
Sieve #5 1.36 tons @ $120.00/ton	163.20
Sieve #6 0.70 tons @ $ 82.00/ton	57.40
	$392.12
Less Harvesting Cost (3.33 tons @ $18/ton)	59.94
RETURN	$332.18

Total

3.33 tons @ $120.00/ton	399.60
Less Harvest Cost (3.33 tons @ $18/ton)	59.94
RETURN	$337.66

August 15

Breakdown

Sieve #2 0.17 tons @ $134.00/ton	$ 22.78
Sieve #3 0.34 tons @ $134.00/ton	45.56
Sieve #4 0.49 tons @ $120.00/ton	58.80
Sieve #5 1.36 tons @ $108.00/ton	146.88
Sieve #6 1.14 tons @ $ 78.00/ton	88.92
	$362.94
Less Harvest Cost (3.51 tons @ $18/ton)	63.18
RETURN	$299.76

Total

3.51 tons @ $120.00/ton	421.20
Less Harvest Cost (3.51 tons @ $18/ton)	63.18
RETURN	$358.02

Explanation of Data

1. Data from the June 28 harvest is not complete as samples were discarded prematurely. The percent waste figure is an estimate.
2. Variety "144" was harvested on June 30 at this stage of maturity by the company.

3. The sampling technique used was not always as objective as it should have been. Consequently some of the data shows considerable variation, and should be considered with this in mind.

Results and Observations

1. On the basis of the data presented a producer being paid on an average of three composite tenderometer readings would receive a higher return than payment on individual sieve size breakdown.
2. Average tenderometer readings of sieve size breakdowns are very close to composite tenderometer readings.
3. For the late varieties, as the pea matures the ratio of vines to shelled peas decreases consistently. However, the amount of sieve size #6 peas increases steadily. We would suggest that a vine to pea ratio of 5:1 would have the best quality pea.
4. In neither case did the economic return indicate that a field was harvested too late, however the early variety came off too soon and the percentage of waste was too high.

To determine the best harvest conditions for each variety sampling should be carried on three or four days past the actual field harvest date. Perhaps in future work this could be kept in mind.

Experimental Tobacco Production, 1969

Three varieties of flue-cured tobacco were grown during 1969. They were "Delcrest 66", "Hick's Broadleaf", and "Yellow Gold". The project was designed to further enhance the possibility of commercial tobacco production in Southern Alberta and to supplement available knowledge on tobacco production for the prairies. This was done with the joint cooperation of the commercial industry.

Growing Procedures

1. Tobacco was seeded in the greenhouse on April 13.
2. Plants were mechanically transplanted using a starter solution during the period May 29 to June 3.
3. Fertilizer was side dressed during the week of June 23.
4. Plants were frequently irrigated by the use of a sprinkler system.

Results and Observations

1. The high intensity sunlight periods experienced during the spring caused the plants to become too large for efficient transplanting. Transplanting was delayed several days because of high winds. Better hardening off procedures are necessary for future production.

2. A rather poor and uneven plant stand was obtained after transplanting, as transplanting was done into very dry soil. An irrigation immediately after transplanting did not help to establish the plants.
3. The soil texture of the plot of land was heavier (A sandy clay-loam) than might be recommended for tobacco production. However, according to commercial experts, such a soil can be used with proper management.
4. The wind protection factor available at this field provided the necessary protection from our high winds.
5. Tobacco growth was very rank due to an excess of nitrogen fertilizer, hence the tobacco did not mature until well into October (consequently no tobacco was harvested).

Recommendations

1. With proper soil and crop management, tobacco could be successfully produced under the conditions in effect in 1969.
2. It is hoped that the project will be carried another year at least. A proper curing kiln is now available and the industry will likely support the project with a man to supervise the harvest and curing.
3. It is essential in any further experimentation that a good plant stand be obtained. This may require hand transplanting and would mean a reduced acreage.

POMOLOGY SECTION

Apple Rootstocks Stooling Bed Studies - Dr. S. Mahadeva

This study was initiated to determine the stooling characteristics of some Malus varieties and selections that demonstrated some dwarfing characteristics. Of eight varieties and thirty-one selections, seven varieties and twenty-two selections produced varying numbers of rooted layers. The selections 5-4-23, 4-7-24, BF 31A, 4-1-19 and 4-7-7 were the top five in the number of rooted layers produced per plant and in the ratings of the number of roots formed per plant. Further study is in progress.

Rooting Study of Malus Hardwood Cuttings - Dr. S. Mahadeva

Terminal and sub-terminal cuttings of BF 31A Malus were used to study their rooting ability in an intermittent mist bed. Cuttings, about four to six inches long with three or four nodes were taken on July 11, 1968 from vigorously growing shoots. The basal ends of the cuttings were dipped in 1000, 2000 and 4000 ppm concentrations each of Indoleacetic acid (IAA), Indolebutyric acid (IBA), Naphthaleneacetic acid (NAA) and IBA + NAA. The concentrated dip method was used in the study. After five seconds of dipping, the cuttings were inserted into a sand rooting medium. The results of the root count on September 29, 1968, are presented in Table I below.

TABLE I. EFFECT OF ROOTING HORMONE TREATMENTS ON ROOTING OF BF 31A, MALUS SP. HARDWOOD CUTTINGS, 1968.

Rooting Hormone	Concentration ppm	Percent Cuttings Rooted		Percent Cuttings Callused	
		Terminal	Sub-terminal	Terminal	Sub-terminal
Untreated	water	0	0	0	7
IAA	1000	0	0	10	2
	2000	10	1	20	4
	4000	0	2	20	5
IBA	1000	10	1	20	4
	2000	0	4	10	5
	4000	30	2	30	4
NAA	1000	10	1	30	0
	2000	30	2	20	5
	4000	50	0	20	5
IBA + NAA	1000	0	1	20	2
	2000	10	7	30	0
	4000	30	5	0	3

Generally, terminal cuttings rooted and callused better than sub-terminal cuttings. The 4000 ppm concentration of all rooting hormones used resulted in a generally superior rooting and callusing compared to the 1000 ppm concentration. NAA at 4000 ppm resulted in rooting of 50% of the terminal cuttings and 20% callused. The percent cuttings rooted with NAA was generally higher than when IAA and IBA were used.

Tree-Fruit Varietal Tests - Dr. S. Mahadeva

This project involves the introduction, maintenance, screening and testing of new varieties and advanced selections of Malus, Prunus and Pyrus which may have potential in the prairies. At the end of 1969, there were a total of 378 Malus, 122 Prunus, thirteen Pyrus and two Prunus armeniaca established in the varietal tests. Data relative to their hardiness, tree vigour, susceptibility to diseases, fruit characteristics, yield and storage ability are being collected and the most promising ones propagated and distributed province-wide under the farm test and demonstration orchard program. The better selections are also used as parents in the Center's Tree Fruit Breeding Program. Some of the varieties and selections of tree fruit that have fared very well and are widely grown in Alberta include the apple varieties Anderson, Anis, Battleford, B.F. 14 (Brooks Fruit Selection), B.F. 27, Breakey, Chipman, Duchess, Early Harvest, Exeter, Goodland, Haralson, Harcourt, Heyer No. 12, Heyer No.20, Mclean, Moscow Pear, Mount, Patterson (Munro), Pioneer No. 10, Rosthern Nos. 15 and 16, and Stranger; the apple-crab varieties B.F. 26, Kerr, Rescue, and Trail; the crab apple varieties Amur Red, Anaros, B.F. 10, Columbia, Dolgo, Florence, Robin and Rosthern No. 8; the rosybloom flowering crab varieties Almey, Arctic Dawn, Jubilee, Royalty, Strathmore, and Sutherland; the white flowering variety Snowcap; the pear varieties David, Fedorovsk, Golden Spice, John, Olia, Peter, Petrovsk, Pioneer No. 3, Pioneer No. 4, Simon, Tait-Dropmore and Tiona; the plum species selections B.F. 40, B.F. 41, B.F. 90, Dandy, Ivanovka, Mandarin, Manchurian seedlings, Norther and Ptitsin numbered selections; the plum hybrids B.F. 58, B.F. 70, Grenville, Ojibwa, and Pembina; the Sandcherry x plum hybrids B.F. 24, Dura, Minn. No. 440, Opata and Skinner's Favourite; and the Brooks apricot selections of Manchurian origin.

Prairie Cooperative Tree Fruit Breeding Project - Dr. S. Mahadeva

The primary objective of this breeding program is to develop apple varieties adapted to the Canadian prairies. The program commenced about 1947 with most of the original crosses being made at the Research Station, Morden, Manitoba. Plant material grown from these crosses was distributed among three initial cooperating stations, and later to seven other stations. The Alberta Horticultural Research Center at Brooks has received about 26,000 apple seedlings. These were grown and evaluated for plant hardiness, vigor, tree form, age at first production, date of bloom, fruit ripening, yield rating, fruit size, colour, quality, storage ability, and apparent susceptibility to disease. Promising fruit selections over two inches in diameter were submitted each year, starting in 1966, to the Cooperative Fruit Committee for evaluation. Up to 1969 about fifty selections from all cooperating stations have been selected and approved for an advanced test including sixteen from Brooks. The fruit selections receiving approval of this committee have been propagated at

Morden, Manitoba for distribution to the three test sites: Melfort, Saskatchewan; Morden, Manitoba; and Brooks, Alberta. By the spring of 1969 a total of eighteen selections and three standard varieties had been planted at Brooks in a replicated Advanced Test plot. A further set of seventeen selections and one standard will be added in the spring of 1970. The selections placed in the Advanced Test will be thoroughly evaluated for hardiness, size, resistance to diseases, desirable fruit quality such as flavor and crispness, red colour, storage quality and cooking quality before eventual naming and release by the Cooperative Fruit Committee.

This breeding project also involves about 2,800 plum seedlings which are currently in the process of evaluation.

Bush Cherries Varietal Trial - Dr. S. Mahadeva

Large seedling populations of Prunus tomentosa, Prunus fruiticosa and Prunus japonica have been evaluated for hardy, large, heavy yielding selections. Two large fruited (over 3/4 inch diameter) selections of P. fruiticosa and one P. tomentosa selection have been made. Studies last summer to propagate these selections by semi-hardwood cuttings were not satisfactory, although some callusing occurred with indole acetic acid using the concentrated dip method. Further studies are in progress.

Apricot Varietal Trial - Dr. S. Mahadeva

Seeds of apricot selections were first received from Manchuria in 1938 and seedlings established at the sub-station at Strathmore, Alberta. These seedlings were grown to maturity and evaluated for tree and fruit characteristics which included tree vigour, age at first production,fruit size, appearance, colour and quality characteristics such as flesh texture and flavour. Sixteen selections showed merit and warranted further evaluation. These are now in the Brooks Second Test Orchard as numbered Brooks Fruit Selections.

Performance of Strawberry Varieties in 1969 - Dr. S. Mahadeva

The strawberry varietal collection was planted in five blocks in the spring of 1968. Each variety was planted in a single row 2.3 meters (7.5 feet long) with 46 cm. (1.5 feet) between plants in the row. The crop was covered with straw mulch in November after a few good frosts and removed late in the spring of the following year.

Survival rating was recorded in June 5, 1969 after the plants had put forth new growth. Plant vigour was rated as a combination of size of individual plants and colour and vigour of foliage. Runner production was rated visually on the number of runners produced. During the 1969 season most of the varieties showed very little damage due to leaf spot.

Table 2 shows the performance of thirty-five varieties in the five blocks. Protem was outstanding in yielding ability: it produced the equivalent of 5.7 tons per acre. The other varieties comprising the top ten in yield are Senga Sengana, Jubilee, Veestar, Superfection, Erie, Vibrant, Geneva, Rich and Red, and Porter's Pride. With a comparable survival rating to the first ten group, the varieties Fairfax, Missionary. Surecrop, Sunrise, Pocahontas, Midland, Florida 90, and Tennessee Beauty were poor yielders with less than the equivalent of 1.5 tons per acre.

About 60% of the varieties in the collection showed complete winter survival and these included most of the top ten yielders and the eight poor yielders mentioned above. Over 40% of the varieties showed a vigour rating of eight and above. Florida 90, Guardsman, Tioga, and Ozark Beauty were low in vigour rating.

In the 1969 observations, Parkland, Earlidawn, Shasta, Guardsman, Tioga and Ozark Beauty were poor runner producers. Superfection, Senga Sengana, Vibrant, Protem, Veestar, Premier and Cavalier were good runner producers.

Frozen fruit quality was evaluated by a Taste Panel using the Center's Standard Score Sheet for frozen fruit. The maximum possible score of 100 included points for appearance (colour and form) before and after thawing, texture, flavour and sweetness. Of nineteen samples evaluated, eleven showed scores of over sixty indicating good quality. Veestar and Geneva had the highest score for quality followed by Jubilee, the standard.

TABLE 2. PERFORMANCE OF STRAWBERRY VARIETIES AT BROOKS, ALBERTA, 1969

Varieties	Yield Kg/ 2.3 Metre Row	Survival Rating*	Plant Vigor**	Runner Production***	Frozen Quality Score
Date Tested		5/6/69			4/2/70
Protem	4.0	10	8	7	61
Senga Sengana	3.8	10	9	8	-
Jubilee	3.7	10	7	6	67
Veestar	3.4	10	8	7	69
Superfection	3.0	10	9	9	59
Erie	2.9	10	8	5	66
Vibrant	2.9	10	9	8	66
Geneva	2.7	10	8	3	69
Rich and Red	2.6	8	7	6	54
Porter's Pride	2.3	8	6	5	65
Redglow	2.2	10	8	6	66
Parkland	2.2	4	9	2	-
Red Rich	2.2	8	6	6	55
Premier	2.1	10	7	7	57
Sparkle	1.8	10	8	5	-
Dixieland	1.8	10	7	4	-
Selkirk	1.7	6	6	6	56
Cavalier	1.6	8	7	7	65
Senator Dunlap	1.6	10	6	5	50
Fairfax	1.4	10	6	6	-
Missionary	1.4	10	6	6	62
Surecrop	1.3	10	8	4	-
Sunrise	1.1	10	7	6	-
Pocahontas	1.1	10	8	5	-
Midland	1.0	10	8	5	-
Florida 90	1.0	10	5	5	59
Tennessee Beauty	.7	10	7	5	62
Catskill	.7	4	6	5	-
Earlidawn	.5	6	7	3	-
Shasta	.4	4	6	1	-
Redcoat	.3	4	8	5	-
Guardsman	.1	4	3	1	57
Tioga	.1	4	4	1	-
Ozark Beauty	-	1	1	1	-
Tendersweet	-	0	-	-	-

* 0 = No Survival
10 = 100% Survival

** 1 = very weak
10 = very vigorous

*** 1 = poor runner production
10 = excellent runner production

Table 3 shows the performance of nine other strawberry varieties grown in a different location at the Center. The length of row for each variety was variable and hence the yield data has not been presented. Survival data was not recorded. Amore was very vigorous with very good runner production but was low in its frozen quality score.

TABLE 3. PERFORMANCE OF STRAWBERRY VARIETIES AT BROOKS, ALBERTA, 1969.

Varieties	Yield Kg/ 2.3 Metre Row	Survival Rating*	Plant Vigor**	Runner Production***	Frozen Quality Score
Date Tested		5/6/69			4/2/70
Amore	-	-	9	9	51
Blackmore	-	-	6	6	60
Dorset	-	-	5	6	60
Fresno	-	-	5	4	59
Gem	-	-	7	7	48
Goldking	-	-	4	5	57
Honeylump	-	-	-	-	-
Marshall	-	-	7	7	56
M 581	-	4	4	1	60

* 0 = No Survival
10 = 100% Survival

** 1 = very weak
10 = very vigorous

*** 1 = poor runner production
10 = excellent runner production

Raspberry Winter Injury and Yield - Dr. S. Mahadeva

A trial involving twenty-five varieties of raspberries evaluated over a seven year period (1959-1965) for their yield potential, winter survival, quality and potential usefulness for breeding programs was carried out by Mr. P.D. Hargrave. A three replicated block was planted in 1957 as a partially balanced incomplete block design arranged in latin square formation. Each replicated row was 9.14 meters long with the rows 3.04 meters apart. Row width was maintained at 30 to 38 centimeters. Routine cultural practices were carried out throughout the season. Fruit was picked twice a week from June through September. Canes were clipped to the point where new leaves had expanded and winter killed tips were evident. The length of cane remaining was dependent on percentage winter survival. Processing samples were taken at peak season, dry packed with sugar, stored at -20oC. and a taste panel evaluation made after six months storage.

The relative standing for yield survival and quality of the twenty-five varieties of raspberry is presented in Table 4.

Cane survival for the years 1959 to 1965 ranged from 1.7 percent for Herbert and Viking in 1964 to 100 percent for Latham in 1959. The varieties that had survival ratings placing them in the top group during the test period included Chief, Indian Summer, Madawaska, Latham, Honey king, Rideau and Ottawa 273.

Yield data placed Chief, Gatineau, Madawaska, Trent, Honeyking, Latham, Rideau, Van Dyke, and Herbert in the top group. Yield ranged from 15,014 grams to one gram per 9.14 meters of row.

Chief was the standard against which each variety was evaluated for quality. The rating for Chief ranged from sixty-three percent to seventy-eight percent. Chief, Ottawa 273, Latham, Rideau, Indian Summer, Gatineau, Madawaska, Van Dyke, Herbert, and Honeyking, in that order, were the varieties with the highest average score.

Generally, the yield of each variety tends to follow the amount of cane winter survival. Madawaska, Latham and Trent because of their high performance rating for survival, yield and quality, met the requirements for commercial production. Chief, equal in survival, was low in yield because of berry size, but was highly acceptable for quality. Marcy, Milton, Newburgh, and Ottawa 277 were consistent from a quality and berry size standpoint but lacked hardiness and yielding ability. Van Dyke was interesting from a breeding standpoint as a variety with yielding ability, some relative hardiness and quality that might be combined through a breeding program.

TABLE 4. RELATIVE STANDING FOR YIELD, SURVIVAL AND QUALITY OF TWENTY-FIVE RASPBERRY VARIETIES AT BROOKS

Variety	Fruit Yield							Cane Survival							Frozen Fruit Quality in %		
Year	'59	'60	'61	'62	'63	'64	'65	'59	'60	'61	'62	'63	'64	'65	Low	Mean	High
Chief	4	4	6	6	9	3	6	4	1	7	6	3	3	2	63	73	78
Durham	19	13	14	12	19	10	15	23	5	16	21	10	8	15	51	64	70
Gatineau	10	5	7	7	2	6	9	18	12	17	16	12	9	12	56	68	72
Herbert	6	3	12	10	7	22	5	13	7	6	15	17	25	17	52	67	78
Honey King	3	1	2	4	4	5	16	5	3	1	2	20	4	19	60	67	72
Indian Summer	13	8	10	15	12	9	13	6	8	5	4	2	7	8	64	69	72
Latham	2	2	1	3	8	8	12	1	2	12	3	6	2	4	64	70	77
Madawaska	1	9	4	2	6	4	2	3	6	2	1	8	1	3	54	68	79
Marcy	18	25	20	22	13	24	23	14	22	11	10	22	20	21	62	65	68
Milton	24	20	9	24	10	15	17	16	21	13	8	14	23	23	57	59	60
Newburgh	11	16	15	19	15	18	7	7	15	3	17	23	21	25	64	66	68
Ottawa	16	18	17	21	17	23	21	20	13	24	23	25	22	22	55	59	66
0-273	21	12	15	9	14	2	10	15	10	8	22	7	6	7	64	71	77
0-277	14	23	16	17	21	19	11	8	16	14	11	18	19	18	58	59	60
Rideau	5	17	8	8	5	7	3	2	18	4	14	1	10	6	66	70	78
September	23	15	18	13	20	13	13	24	14	18	20	5	13	11	48	62	69
Starlight	22	10	22	20	24	12	14	22	11	23	25	4	11	5	61	67	70
Sunrise	15	11	19	14	18	25	25	9	19	15	9	15	15	13	57	63	68
Taylor	20	19	23	18	22	17	19	19	25	20	5	13	17	10	--	54	--
Thames	25	24	21	25	25	20	24	25	24	25	19	24	18	24	--	63	--
Trent	9	6	3	1	1	1	1	17	4	21	12	11	5	1	55	66	70
Tweed	7	14	11	11	3	11	8	12	23	10	15	9	12	14	49	62	68
Van Dyke	8	7	5	5	11	14	4	11	9	9	7	21	14	16	61	68	73
Viking	12	22	25	16	16	16	20	21	17	19	24	19	24	20	--	72	--
Washington	17	21	24	23	23	21	22	10	20	22	18	16	16	9	52	55	58

Performance of Raspberry Varieties at Brooks in 1968 and 1969 - Dr. S. Mahadeva

Twenty-one named varieties and advanced selections of raspberries were established in a single block at the Center in 1966. Each variety was planted 0.16 meter apart in a 10 meter row with 2.44 meters between rows. The canes were not winter protected or covered. Winter injury was visually rated from 0 (with no injury) to 10 (where the canes were killed completely to the ground). Plant vigour was rated in 1969 only, as a composite of size of canes, and colour and vigour of foliage. The rating ranged from 1 (very weak) to 10 (indicating very vigorous canes). Yield was recorded from 5 meters of row where plant stand was uniform. Frozen fruit quality was evaluated by a taste panel using the Center's Standard Score Sheet for Frozen Fruit. Points considered were appearance (colour and form) before and after thawing, texture, flavour and sweetness. The maximum possible score was 100.

Table 5 presents the performance of the twenty-one varieties studied during 1968 and 1969. The black and purple raspberries are not hardy without winter protection at Brooks. Among the named red raspberries, Bailey, Bristol and Columbia had the highest winter injury rating for both years, while Chief and Boyne showed the lowest injury. Almost all the numbered selections wintered very well.

Plant vigour rating for 1969 was generally low for the black and purple fruited varieties and for the Bailey, Bristol and Columbia red raspberries. Chief, and Comet were the most vigorous varieties with Boyne and the Morden 'M' series doing well.

In general, the 1968 yield of fruit was low compared to that of 1969. Lowden Black yielded very few fruit while Aubin Black and Wyoming Purple gave a very low yield. Among the red raspberries, Bailey and Bristol bore very few fruit during both years while Columbia had no fruit in 1968 and a very light crop in 1969. Among the named varieties Boyne yielded well in both years. The lower yield of Chief is, to a large extent, due to smaller sized berries. The numbered selections yielded very well.

Chief, the standard variety used in the frozen fruit quality evaluation, was rated best in both years. Boyne, and Amber were also rated very high for quality. Among the other named varieties Creston and Killarney were rated good in quality scores. Columbia, Comet, Lowden Black, Tahoma and Wyoming Purple received low scores for quality. A score of 65 and below would indicate poor quality.

TABLE 5. WINTER INJURY, PLANT VIGOUR, YIELD AND QUALITY OF TWENTY-ONE VARIETIES OF RASPBERRY AT BROOKS 1968 and 1969.

Variety	Winter Injury Rating		Plant Vigour Rating	Yield in Grams Per 5 Meter of Row		Frozen Fruit Quality Score	
Date of Test	28/5/68	27/5/69	12/6/69	1968	1969	1968	1969
Amber	6	5	4	886	890	70	72
Aubin Black	8	8	4	183	162	--	--
Bailey	9	9	1	---	---	--	--
Boyne	2	1	8	4013	6916	73	69
Bristol	8	9	2	---	25	--	--
Chief	2	2	9	1904	5556	74	74
Columbia	8	6	3	---	735	--	62
Comet	5	4	9	565	3253	--	62
Creston	5	3	4	894	4706	68	69
Killarney	4	2	7	1043	5580	65	69
Lowden Black	9	9	2	---	20	--	64
Tahoma	4	3	6	4773	4694	60	62
Wyoming Purple	7	6	4	658	1417	61	61
E 603	4	4	6	2131	2255	65	61
E 607	3	3	6	3174	3858	60	61
E 609	3	1	6	655	7436	67	62
M 531	3	1	7	1189	5683	69	67
M 535	3	2	9	1977	5948	66	62
M 541	2	1	8	3590	6029	62	63
M 542	3	1	8	2917	7295	67	74
M 543	1	1	8	5454	6462	67	67

Injury Rating

0 = no injury
10 = cones completely killed

Plant Vigour Rating

1 = very weak
10 = very vigorous

Effect of Three Mulches on the Yield and Percentage Soil Moisture of Protem and Jubilee Cultivars of Strawberry at Brooks - Dr. S. Mahadeva

A preliminary trial was established in the spring of 1968 using 4 mil clear plastic, 4 mil black plastic and 2 inch straw mulch on two cultivars of strawberry - the June bearing Protem, and everbearing Jubilee. The unmulched plots were hand weeded as required. Each row was 10 meters long with 1 meter between plants in the row. The rows were 1.22 meters (4 feet) apart. The trial was laid out as a randomized complete block field design with four replications. Routine cultural practices were carried out and sprinkler irrigation was given as required during the growing season. All flowers were removed during 1968. Soil moisture was determined on a percent by weight basis at weekly intervals at 0 to 6 inches and 6 to 12 inch depths. The soil samples were oven dried at 110 degrees C. till a constant weight was achieved. Table 6 gives the mean soil moisture percentages by weight from the three mulches studied.

In general, the mulches maintained a slightly higher soil moisture percentage compared to the unmulched treatment. There was no visible stress to the strawberry plants due to a lack of moisture in any of the mulches used.

The total yield and weed control rating presented in Table 7 represent the means from four replications.

As expected, the black plastic mulch gave excellent weed control and helped keep the berries clean. The clear plastic did not control weeds well since they were able to receive sufficient sunlight to grow. Some of the weeds pushed through openings in the clear plastic where the strawberry plants were set. Weed control rating at the beginning of the season on the straw mulch indicated better control compared to the clear plastic and unmulched plots. All treatments were hand weeded after the first observation. At the time of the second rating the unmulched and clear plastic plots still showed unsatisfactory weed control. Straw mulch treatment indicated an improvement since the newly emerging weeds were, to a large extent, smothered.

The yield data from both varieties studied indicated very high yields for the unmulched compared to the other three mulches. The runners were able to root very well with the unmulched plot and to a limited extent with the straw mulch to produce a good matted row. This was, however, not the case with both the plastic mulches where the runners could not root. It is possible to compensate for yields with the plastic mulches by closer spacing between plants in the row so that larger crown development can be encouraged.

TABLE 6. MEAN SOIL MOISTURE PERCENTAGE BY WEIGHT FROM THREE MULCHES IN 1969

Mulch and Depth of Sample	Dates of Samples													
	10/6	16/6	23/6	30/6	7/7	14/7	21/7	28/7	4/8	11/8	2/9	7/9	17/9	25/9
Black Plastic 6"	16.8	15.6	15.8	19.o	15.0	13.8	12.3	14.4	13.7	12.6	12.5	17.9	14.2	17.1
Black Plastic 12"	17.1	15.9	16.1	18.7	15.5	15.5	12.6	14.8	13.8	13.8	12.3	17.3	14.5	16.7
Clear Plastic 6"	16.2	15.4	14.9	19.3	15.1	14.2	13.3	13.6	14.4	12.6	13.0	17.5	15.6	16.9
Clear Plastic 12"	17.0	16.0	15.0	17.9	15.0	15.1	13.3	13.6	14.5	13.3	11.7	16.7	14.8	16.3
Straw Mulch 6"	16.2	15.4	14.0	18.9	15.4	13.9	13.2	12.7	15.0	13.0	12.0	17.9	14.3	16.6
Straw Mulch 12"	16.9	16.1	14.9	18.3	15.7	14.9	13.5	12.7	15.3	13.6	12.2	17.6	15.5	15.3
Unmulched 6"	15.0	13.6	13.0	18.7	13.4	14.1	12.2	13.2	15.6	12.4	12.2	18.1	14.3	17.0
Unmulched 12"	15.1	14.8	13.3	18.3	14.2	15.3	13.2	13.3	14.7	13.2	11.4	17.1	14.4	14.9

TABLE 7. YIELD AND WEED CONTROL RATING OF TWO VARIETIES OF STRAWBERRY GROWN ON THREE MULCHES

	Mean Weed Control Rating		Yield in Kg. Per 10 Meter Row	
	Date of Rating		Varieties	
Kind of Mulch	6/5/69	17/6/69	Protem	Jubilee
Black Plastic	10.0	9.6	3.7	5.7
Clear Plastic	5.2	4.2	3.5	6.1
Straw Mulch	3.7	2.1	3.8	7.7
Unmulched	1.0	4.6	8.5	10.0

Weed Control Rating: 1 = no control
10 = complete control

Some Observations on the Effects of Growth Retardants on Twenty-Five Cultivars of Raspberry in 1968 and 1969 - Dr. S. Mahadeva

Dieback of raspberry canes is one of the factors associated with reduced raspberry yields at Brooks, as the canes are not winter protected at the Center. Work by other researchers has indicated that growth retardants could be effective in reducing cane dieback.

The effects of two growth retardants - Alar 85 (Succinic acid 2, 2-dimethyl hydrazide) and Niagara 10637 (Ethyl hydrogen 1 - propyl phosphonate) were studied on twenty-five cultivars of raspberry at the Center in 1968 and 1969. The raspberries were planted in three replicated blocks in 1957. Each block represented a replicate of seven cultivars of which one row was the cultivar "Chief".

After blooming was almost completed, the growth retardants were sprayed on (June 25, 1968) with a hand sprayer using a large enough volume to thoroughly wet the foliage. In the fall of 1968, the height of current years cane growth was measured from five randomly selected canes in each treatment. Observations on the length of cane tips winter killed were recorded on May 27, 1969 after the new leaves had expanded and the winter killed cane tips were very evident. Five canes per treatment, selected at random, were used to obtain this measurement. Yield was recorded from 1 meter of row in each treatment.

Alar 85 was sprayed at 1000 and 2000 ppm in the first three replicated block consisting of the cultivars Latham, Viking, Madawaska, Ottawa 277, Chief, Durham, and Herbert. There was a general tendency for the sprayed canes to be shorter than the unsprayed with the higher concentration being slightly more effective than the lower concentration used. A slight reduction in the cane tips winter killed was observed on Herbert, Madawaska and Ottawa 277. Yields were not adversely affected by the sprays.

A 3000 ppm concentration of Alar 85 was sprayed on the second three replicated block comprising Rideau, Indian Summer, Milton, Ottawa 273, Chief, Ottawa, and Thames. The height of the sprayed canes were slightly lower than the unsprayed except for Indian Summer and Chief. Again, a slight general reduction in the length of cane tips winter killed. There was, however, no corresponding increase in yield resulting from reduced cane injury.

The third three replicated block of the cultivars Bonanza, Muskoka, Williamette, Sylvan, Chief, Comet, and Early Red were sprayed with NIA 10637 at 2000 and 3000 ppm. Slightly shorter canes were observed on Sylvan, Comet, and Chief at the higher spray concentration. Williamette and Early Red showed slightly reduced cane tips winter killed at both concentrations used, while Bonanza and Muskoka had reduced cane tips winter killed at the higher concentration only. The yield from treated cultivars Comet, Bonanza, and Early Red was slightly higher than the untreated material. The higher yield of the two latter cultivars was probably partly associated with reduced winter injury as a result of the treatments.

NIA 10637 was also sprayed at 4000 ppm on a fourth three replicated block of the cultivars Tweed, Sunrise, Washington, Van Dyke, Chief, Honey King, and Marcy. The growth retardant spray shortened the canes with the exception of Chief. All cultivars except Sunrise and Marcy had some reduction in cane tips winter killed. This did not correspond with any increase in yield.

There is, therefore, evidence to indicate that both Alar 85, and NIA 10637 sprayed canes tended to cause shorter canes in some cultivars compared to the unsprayed treatments. There was also a trend towards reduction in the length of cane tips winter killed in some of the cultivars. The growth retardants did not reduce yields to any appreciable extent, and there was some evidence of slight increase in yields in some cultivars partly due to reduced winter cane kill.

Strawberry Weed Control - R.A. Reesor

Dacthal at 15 pounds A.I. (active ingredient) and Tenoran at 4 pounds A.I. were sprayed on two blocks of strawberries. Dacthal was not too effective in early spring but residual control of weeds was evident later in the season. Tenoran was not as effective as Dacthal on a predominantly stinkweed population.

Orchard Weed Control - R.A. Reesor

Early spring application of 2, 4-D at 10 fluid ounces per acre controlled over-wintering biennials and other early germinating broad-leaved weeds. Later, Gramozone (Paraquat) as a directed spray around the base of mature trees was very effective in controlling weeds.

ENVIRONMENTAL HORTICULTURE

Woody Ornamentals - D.L. Douglas

The Alberta Horticultural Research Center is one of eight co-operating stations in the three Prairie Provinces for the Prairie Regional (Zonation) Trials for Woody Ornamentals. This program was instituted in 1958 through the efforts of the Western Canadian Society for Horticultural Science in an attempt to determine which plants are hardy under prairie conditions. The Morden Experimental Farm acts as the co-ordinating unit in propagation of material for distribution and accumulation of data collected annually. The plants have a five year evaluation period. This forms the basis for our hardiness trials but in addition plant materials have been acquired from private plant breeders, nurseries, other research institutions and most important from native sources for trial.

Areas have been set aside where the plants can be evaluated as well as being viewed by the public. One of our major problems in establishing these woody ornamentals has been the alkalinity of one plot and the difficulty in supplying adequate water to these plants. By using a new system of watering, re-establishing plants and providing drainage, many of these problems have been alleviated.

Roses - D.L. Douglas

A formal rose garden bordered by a Colorado spruce hedge has been established at the Center for display and plant evaluation. From past experience the following roses have been winter hardy at Brooks and overall performance has been good.

(P) ...... Requires Winter Protection

Floribunda (P)	China Doll Independence Orange Triumph Poulsen's Bedder
Hybrid Tea (P)	Confidence John S. Armstrong Memorial Miss Canada Peace
Grandiflora (P)	Queen Elizabeth
Hybrid Perpetual (P)	Frau Karl Druschki Mrs. John Laing
Semi-Climber (P)	Maigold

Hardy Shrub Roses

Assiniboine
Cuthbert Grant
George Will
Grootendorst varieties
Hansa
Isabella Skinner
Martin Frobisher
Mrs. John McNab
Prairie Charm
Prairie Dawn
Therese Bugnet

Herbaceous Plant Material - D.L. Douglas

Collections of herbaceous plant material are maintained for hardiness and overall evaluation as well as for display purposes.

Annuals

Annuals trials have been conducted at the Alberta Horticultural Research Center since 1965. Seed samples from Pan American and Harris seed companies were received in 1967 to be incorporated into these trials. Outstanding bedders under our warm dry summer conditions have been petunias, marigolds, geraniums, everblooming begonias, salvia, pansies, and dusty miller. Other annuals which have shown promise as bedders are ageratum, vinca, basil (dark opal), snapdragon, annual sweet william, verbena, dimorphotheca, dianthus, and Godetia (Unwins). Some plants such as amaranthus, coleus, torenia (wishbone flower), mimulus (monkey flower), schizanthus, and nemesia commonly used as bedders in other parts of Alberta and Canada are not acceptable under our hot summer conditions, but some have a value in shady locations. Edging annuals commonly and effectively used are ageratum, lobelia, alyssum, dusty miller, nierembergia, dwarf zinnias, dwarf snapdragons, portulaca, mesembryanthemum and marigold. Noteworthy annuals in the last three years have been *Celosia cristata* 'Empress', *Salvia horminum* (clary), *Cosmos* 'Sunset', *Tagetes* (marigold) 'Irish Lace', flowering kale, *Zinnias* 'Torch', 'Winesap', 'Minipink', and 'Old Mexico', *Petunia* 'Prairie Moon' and 'White Bountiful' and *Lathyrus odoratus* (sweet pea) 'Little Sweetheart'.

Perennials

A wide array of hardy herbaceous perennials are on trial at the Alberta Horticultural Research Center. A mixed perennial border and a rock garden have been developed for display purposes in addition to blocks of specific perennials. A ground cover collection is presently being established.

Spring Flowering Bulbs

Tulips form the main group of spring flowering bulbs. The tulip trial was originally set up to test the feasibility of growing tulips for bulb production on a commercial scale. The outer protective skin does not adhere tightly to the bulb and in some years bulb multiplication has been poor, therefore, this idea was discarded. The tulips are now evaluated from the standpoint of hardiness and usefulness in the landscape. Tulip varieties presently on trial with notes on approximate bloom date are listed below.

7 varieties of Single Early	Early May
7 Species	Early to mid May
31 varieties of Darwin and Darwin Hybrids	Early to late May
4 varieties of Triumph	Mid May
5 varieties Breeder	Late May
1 variety of Double Late	Late May
5 varieties of Cottage	Late May
3 varieties of Lily-Flowered	Mid to late May

The Centennial Tulips distributed by the Canadian Cystic Fibrosis Association in 1967 have been outstanding in size, color (scarlet, yellow centre), and fragrance. Of the species of tulips grown, _Tulipa tarda_ provides bright yellow, low, early bloom in the spring and is an excellent tulip for use in rock gardens. Daffodils, scilla, crocus, and anemone have been grown with reasonable success.

Iris

The iris collection was expanded by an addition from the Montreal Botanic Gardens in 1967. Irises presently grown with approximate bloom dates are listed below.

9 _Iris pumila_ varieties	Mid May
44 _Iris germanica_ varieties	Early to mid June
4 _Iris siberica_ varieties	Mid June

Of the eight species of Iris grown, three have not survived and two of the _Iris siberica_ varieties were not hardy.

Peony

A revision of the peony trials to include five plants of each variety is presently underway and future evaluation of peonies will be more detailed. There are now 48 varieties on trial.

Lilies

In 1967, 55 varieties of lilies which have been winter hardy and of outstanding merit were on trial. All Patterson lilies presently available have been included in this trial. The general bloom period for the lilies in 1969 was from June 27 to July 21. Lilies of excellent worth, suitable for various purposes are here listed.

- Bedding:
  - Mosquito
  - Mega
- Cut Flower and Floral Display:
  - White:
    - White Gold
    - White Princess
  - Rose:
    - Rose Dawn
    - Rose Queen
    - Jasper
    - David
    - Burnished Rose
  - Yellow:
    - Lemon Lady
    - Lemon Queen
    - Coronation

Fall Aster

A small plot of six varieties of fall asters is maintained which provides excellent fall color.

Chrysanthemums

Due to chinook conditions, chrysanthemums hardy in other parts of the prairies have not survived our winters. Therefore, a new method of handling chrysanthemums was instituted whereby mother plants of each variety were overwintered in the root cellar and then forced in the greenhouse in March. Enough softwood cuttings of specific varieties were made to use for bedding purposes. The original perennial trial was also maintained. In this manner, chrysanthemums are treated as both annuals and perennials. Varieties which have been proven of merit as perennials are: Morden varieties Amber, Gold, Canary, Chestnut, Cameo, Candy, Bonfire; Mesa, Wahoo Chief, Buffalo, Dr. Longley, Mohave, Maverick, Mesabi, Bighorn, Powder River, Red Warrior. New series of chrysanthemums introduced in 1967 are the new Lethbridge series (5 varieties), Fathers of Confederation series from Morden Experimental Station (10 varieties), and the Brandon Series (11 varieties), all of which have proven to be outstanding.

Gladiolii

The most extensive collection of herbaceous ornamentals at the Alberta Horticultural Research Center is the gladiolii. This collection was originally the private collection of the late Mr. Thomas Kilduff, former assistant superintendent at the Alberta Horticultural Research Center, who upon his retirement donated the collection to the Center. There are approximately

15,000 corms consisting of 1,300 varieties in the collection. This includes a library of many of the old or 'museum' varieties. An attempt is made to grow the "Top Fifty" gladiolii as well. Heat treatments of 80°F. ten days prior to planting and ten days following harvesting are carried out as part of the regular gladiolii corm treatment. A breeding program on a limited scale will be re-introduced.

Poplar Timber Trial - D.L. Douglas

Due to the importance of poplar as a shelterbelt and ornamental tree on the Prairies, and its problems related to longevity, diseases, and insects, a trial to evaluate poplar species, hybrids and clones, etc. has been set up. Evaluation pertaining to potential of poplar as a source of pulpwood will also be investigated. *Populus* is therefore being propagated in preparation for establishing this trial in 1970.

Shelterbelt Investigations - D.L. Douglas

Plans to implement shelterbelt investigations in cooperation with the Western Canadian Society of Horticulture Subcommittee on Shelterbelt were initiated in 1968.

Shelterbelt Renovation

An extensive program of shelterbelt renovation was carried out by Klem Froning of the Federal Department of Forestry in February, 1968 with the cooperation of the Ornamentals staff of the Center. This program consisted of thinning a row of *Populus*, topping *Populus* at various heights, topping *Salix* and removal of a row of *Salix*.

The Center's program of renovation, separate from the forestry program, continued in 1969. Diseased trees (*Populus*) were removed, one row of *Salix* interferring with traffic was removed and an entire row of *Populus* which was smothering adjacent long-lived trees was removed. Extensive pruning of *Ulmus pumila* along roadways was also carried out and replacements made in already established rows of trees.

Trials will be set up in 1970 to determine economics of shelterbelts (as they relate to special crops production).

Shelterbelt Weed Control in 1969 - R.A. Reesor and Dr. S. Mahadeva

A four replicated shelterbelt herbicidal trial was set up in the spring of 1968. The shelterbelt plants included *Acer negundo* (Manitoba Maple), *Fraxinus lanceolata* (Green Ash), *Prunus maackii* (Amur Cherry), *Prunus virginiana* (Chokecherry), *Caragana arborescens* (Caragana), and *Populus* species (Brooks No. 6 Poplar). Initial difficulty was experienced in establishing the shelterbelt material towards the south end of the plot on account of soil alkalinity. The chemicals used were Simazine (2 pounds A.I.), Linuron (2 pounds A.I.), Chloroxuron (4 pounds A.I.), and Chloramben (4 pounds A.I.) along with unweeded, handweeded and cultivated treatments. Damage to small-sized plant material by the chemicals was noticeable. Plants of good size and vigor were more tolerant to the herbicides. Simazine, Linuron, and Chloramben resulted in good weed control while Chloroxuron was generally unsatisfactory as a chemical for weed control. The major weeds present were sow thistle, lamb's quarters, dandelion, red root pigweed, Canada thistle, bindweed, stink weed, green foxtail, wild mustard and the common plaintain.

Propagation - D.L. Douglas

The Alberta Horticultural Research Center acts as a nursery center in production of trees for shelterbelt purposes.

A proportion of the poplar and willow produced from hardwood cuttings for Alberta have been grown at the Center as well as species grown from seed to provide material for shelterbelts, fruit and 4-H bundles.

A summary of shipping for the last three years is given below.

1967 The plants were harvested in the fall of 1967 for shipping in the spring of 1968. The shelterbelt trees were shipped to Oliver Tree Nursery for allocation and distribution. The 4-H bundles and fruit bundles were shipped from Brooks.

There was a 50% take on poplar and willow hardwood cuttings.

Poplar	256,760
Willow	49,200
Shrub and tree species	34,400
4-H bundles 135 (6 kinds of a total 11 plants/bundle)	1,480
Fruit bundles 400 (11 kinds of a total 45 plants/bundle)	18,000
TOTAL	359,840

1968 The plants were harvested in the fall of 1968 for shipping in the spring of 1969.

Fruit bundles were assembled in Brooks and shipped with the other shelterbelt material for distribution from Oliver. The tall growing fruit bundle was color coded. The 4-H bundles were shipped from Brooks.

There was a 70% take on poplar and willow hardwood cuttings.

Poplar	90,865
Willow	35,850
Shrub and tree species	100,185
Liners	30,000
4-H bundles 110 (6 kinds of a total 10 plants/bundle)	1,100
Low fruit bundle 400 (6 kinds of total 33 plants/bundle)	21,200
Tall fruit bundle 400 (7 kinds of total 46 plants/bundle)	18,400
TOTAL	297,600

1969 The plants were harvested in the fall of 1969 for shipping in the spring of 1970.

The fruit bundles (color coded) were assembled in Brooks and shipped with the other shelterbelt material for distribution from Oliver. The 4-H bundles were assembled and labelled in Brooks and distributed with the other shelterbelt plants from Oliver.

There was an 85% take of poplar and willow cuttings.

Poplar	98,770
Willow	31,875
Shrub and tree species	100,185
Liners	24,000
4-H bundles 110 (7 kinds of a total 18 plants/bundle)	1,980
Fruit bundles 800 (11 kinds of a total 36 plants/bundle)	28,800
TOTAL	285,610

Hardwood Cuttings

Poplar and willow grown for the shelterbelt program are produced from hardwood cuttings harvested from the stooling beds. Due to the poor condition and age of the established stooling beds at the Oliver Tree Nursery and at the Alberta Horticultural Research Center, it was decided to establish a new stooling area to provide poplar and willow whips for the entire shelterbelt program.

This stooling area was set up at the Isolation Station of the Alberta Horticultural Research Center. Rows were planted at 16 foot spacing and the area between the rows was initially planted with a cover of oats and Crested Wheat grass. One thousand Brooks #1 (Griffin) poplar were planted in 1968 and 3000 Russian Male poplar and 1000 Brooks #6 poplar were planted in 1969. A few Griffin poplar whips were harvested in the fall of 1969.

Poplar and willow whips have been harvested in Brooks and shipped to Oliver. The cuttings to be used at Brooks have been cut in 8" lengths, treated with a 2% Semesan dip for 20 to 30 minutes, stored in poly at 0°F. and 32°F. and returned to Brooks in the spring for planting. Cuttings are now stored at 0°F. as this method of storing produces the best results. Cuttings were usually planted between mid May and early June and harvested in mid October. The plants are clean cultivated, hand weeded between plants once per season and irrigated.

Cuttings were planted by hand in 1967. Half of the cuttings were planted in a field that was fallow in 1966 and half were planted in a field where cuttings were planted in 1966. 16-20-0 at a rate of 300 pounds per acre was applied in the spring of 1967 to the cutting areas. Healthier, more vigorous plants developed on the field that had previously been fallow.

A two row cutting planter was built in the winter 1967-68 based upon the design of a cutting planter at P.F.R.A. Tree Nursery, Indian Head, Saskatchewan. Cuttings were therefore planted by machine in 1968 and 1969.

The plants are undercut in the fall, pulled, bundled, and heeled-in until shipped to Oliver.

Lathhouse Production

Since a source of propagating material of hardy plant materials is essential to the shelterbelt program, plants for seed production have been established at the Alberta Horticultural Research Center. These stock plants were initially set up in blocks but when the plants matured, seed picking and maintenance became very difficult due to the crowded conditions. Therefore, the new stock plantings of the seed source material are being re-established in rows in Plot 17 to facilitate seed picking and cultivation. Seed rows were established in 1967, 1968, and 1969.

Fruit is picked by hand, cleaned and the seed stored in a dry state. To determine the time involved in this area the following records were tabulated in 1967.

TABLE I. MAN HOURS REQUIRED TO PICK FRUIT OF SHELTERBELT PLANT MATERIAL.

Latin Name	Common Name	Man Hours to Pick Fruit	Total Pounds of Fruit Picked	Total Pounds of Clean Seed Yielded
Amelanchier alnifolia	Saskatoon	208	751	7
Cornus stolonifera	Redtwig Dogwood	75	195	15
Crataegus cerronis	Chocolate Hawthorn	40	550	87
Prunus dropmoreana	Dropmore Cherry	24	100	8
Prunus maackii	Amur Cherry	12	25	2
Prunus padus	May Day Tree	156	305	31
Prunus pensylvanica	Pincherry	108	275	42
Prunus tomentosa	Nanking Cherry	64	554	52
Prunus triloba	Single Flowering Plum	24	120	37
Ribes diacanthum	Siberian Red Currant	24	25	1

Seeds were initially sown in a lathhouse area but with improved irrigation facilities, two of the lathhouses have been eliminated in the past 3 years and open bed seed areas extended. There are presently one lathhouse and three open bed areas in production. This greatly facilitates the use of mechanized harvesting techniques.

Various stratification methods are employed beginning in January for spring seeding. Stratification in peat moss is the most common practise. After the seeds have been sown, a one inch sand mulch is used to cover the seed bed resulting in more even germination and some weed control. In 1967 *Elaeagnus angustifolia* (Russian Olive) fruit was cleaned and stored. By using new seed better germination resulted. Fall seeding for the following species was used in 1967 - *Viburnum sargentii*, *Hippophae rhamnoides*, *Lonicera tatarica*, *Cornus stolonifera*, *Elaeagnus angustifolia*, *Rosa 'Hansen Hedge'*, *Prunus serotina*, *Prunus pensylvanica*, *Prunus fruticosa*, *Ribes 'Albol'*, and *Shepherdia argentea*. Germination resulting from 1967 fall seeding was poorer in the open bed area than in the lathhouse area due to lack of snow cover in this area as well as drying winds.

In 1968 manure was incorporated into some of the seed beds. A total of 977 pounds of seed in the spring of 1968 were sown. 16-20-0 at a rate of 4.5 pounds per 1000 square feet was used in the seed area in the early spring.

A total of 523 pounds of seed were sown in the spring of 1969 and 137.5 pounds of seed in the fall of 1969. 10-30-10 at a rate of 10 pounds per 1000 square feet was applied during the spring of 1969. Due to breakdowns in the undercutter, a Noble blade was employed for harvesting the seedlings resulting in plants with excellent root systems.

Softwood Cuttings

A poly cloche sprayed with shading compound was used for propagation of softwood cuttings in 1967. Two 3' beds consisting of ½ compost and ½ peat moss by volume with a 1" sand mulch and equipped with mist nozzles on risers were set up in the cloche. Seradix rooting hormones were used. The three commercial preparations were used on *Caragana* and *Ribes* with little difference in time of root initiation and number of roots resulting. *Elaeagnus angustifolia* cuttings stuck produced no roots. There was overall good rooting and top growth on cuttings stuck of the 50 kinds of plants stuck. The poly cloche was removed in the fall of 1967 and the plants transplanted in the spring of 1968 to pertainers.

A new wooden frame 12' x 60' covered with Fulcon and equipped with an automatic misting system was erected in June 1968. Three 3' beds were set up with the same media as in 1968. Eighty-one kinds of plants were stuck. These were fed with complete fertilizer in July. The cover was removed in the fall, plants overwintered outside and transplanted to pertainers in the fall of 1969.

Cuttings from one hundred and sixty-seven kinds of plants were taken in 1969 and stuck in the propagating frame. Procedures as outlined above were followed.

Ornamental Budding

The following budding has been carried out in search of non-suckering rootstocks for the various materials listed.

Hippophae rhamnoides on *Elaeagnus angustifolia* in 1965 - kill out including rootstock winter 1967-68.

Schubert chokecherry on *Prunus salicina* - good union, slow growth.

Populus alba nivea on *Populus* Brooks #1 (Griffin).

Salix exigua on *Salix pentandra* and *Salix acutifolia*.
Little success in 1967, Better in 1968 but little growth.

Hybrid tea roses on Rosa canina - good growth during growing season.
Six inch covering for the winter but buds killed, no damage to rootstocks.

Young's Weeping Birch, lilac varieties, and double flowering plum were all budded for landscaping use on the Center.

Greenhouses for Evaluating Glazing Materials - D.L. Douglas

Six conventional style iron and aluminum greenhouses each 25' x 50' were erected by August 1967 from designs originating in Alberta. The individual greenhouses were placed end to end with a 10' buffer zone connecting each of the houses. Orientation of the entire unit is east-west. 18" side walls were constructed of two sheets of reinforced fibreglass with styrofoam between extending 6" into the ground. The houses were constructed to test the following glazing materials: lapped glass, butted glass, reinforced fibreglass, rigid poly vinyl chloride, Mylar, and a single layer of 4 mil polyethylene (UV-4). The construction of these greenhouses was modified depending upon the glazing material utilized. For instance aluminum sash bars were used on the glass houses, painted wooden sash on the film houses and extra purlins only on the greenhouse covered with corrugated rigid materials. Since Mylar was no longer available for greenhouse covering after January 1969, it was removed and replaced with Fulcon 950, a reinforced polyethylene material from Japan. A double layer of polyethylene with a 1" air space between was used as a covering on the house covered with 4 mil polyethylene in the winter 1968-69. This house had previously been the most expensive to heat but with the double layer of poly the cost of heating was comparable with the other five houses. However, the double layer of poly resulted in low light penetration, high humidity and consequently a higher incidence of disease and a lower total yield than in the other greenhouses.

Infra-red method of heating (six burners per house) is used in the study. To date, this system has proven satisfactory for heating, however, maintenance of the burners and switches has been a constant problem. As well, the soil cannot be sterilized since a source of steam is not readily available. A fan-jet method of cooling, additional louvers and a high pressure mist system ventilate and cool the greenhouses. Tile drains at a depth of 18" and a manually controlled watering system add to the efficiency of these greenhouses.

Blueprints of these greenhouses are available from the Alberta Horticultural Research Center at a cost of $20.00 a set. A total cost analysis was carried out in 1969. The total costs per square foot of greenhouse are given as follows:

Basic greenhouse steel structure	$ .552
Side wall	.311
Ventilation (not including extra louvers and mist system)	.314
Heating (6 Co-Ray-Vac) units/greenhouse)	1.240
Total Cost of glass greenhouse	3.91
Total Cost of PVC greenhouse	4.14
Total Cost of Fibreglass greenhouse	4.61
Total Cost of Mylar greenhouse	4.36
Total Cost of UV-4 greenhouse	4.06

Individual gas meters are connected to each of the six greenhouses to determine the heating cost of the individual greenhouses. Gas rate in the Brooks area for 1968 was $2.50 for the first 2000 cubic feet and $ .38 for each additional 1000 cubic feet. Costs of heating the six greenhouses for the 1968 (spring and fall crop) are as follows:

Lapped Glass	$ 189.19
Butted Glass	191.77
Fibreglass	204.21
PVC	197.71
Mylar	182.16
UV-4 (single layer 11 months, double layer 1 month)	207.20
	$1,172.29

Tomatoes have been planted in these greenhouses as it was felt they would be good plants for measuring the effect of the various glazing materials. The tomatoes are planted in ground beds with a straw mulch on the walks. A fall and spring crop of tomatoes have been planted yearly since 1967. The results from these trials are presented in the tables that follow.

TABLE 2. MEAN YIELD OF THREE VARIETIES OF TOMATOES (TUCKCROSS, MICHIGAN-OHIO, TUCKQUEEN) IN KILOGRAMS, FALL CROP 1967.

Greenhouses	Mean Total Yield in Kg.	
Fibreglass	139.23	a*
PVC	111.83	b
Mylar	103.65	b c
UV-4	93.69	c d
But Glass	90.56	c d e
Lapped Glass	88.45	c d e

* Any two means not followed by the same letter are significantly different at P = 0.05 level.

1. Fibreglass - best and different from all others
2. PVC and Mylar - no difference
3. All other greenhouses are the same in total yield
4. Average total yield 4.1 pounds per plant

TABLE 3. MEAN YIELD IN KILOGRAMS OF TWENTY-FOUR VARIETIES OF TOMATOES, SPRING CROP 1968.

Greenhouse	Mean Total Yield in Kg.	
Fibreglass	47.56	a*
Mylar	44.84	a b
PVC	42.63	b c
But Glass	41.12	b c
UV-4	40.09	b c
Lapped Glass	37.73	c

* Any two means not followed by the same letter are significantly different at P = 0.05 level.

1. The Fibreglass and Mylar greenhouses are not significantly different from each other in total yield but the Fibreglass greenhouse differs significantly from the remaining greenhouses in total yield.

2. The Lapped Glass greenhouse gave the lowest total yield and was significantly lower than the Fibreglass and Mylar greenhouses.

TABLE 4. MEAN YIELD OF TWENTY-FOUR VARIETIES OF TOMATOES (SIX GREENHOUSES) IN KILOGRAMS, SPRING CROP 1968

Tomato Varieties	Mean Total Yield in Kg.	
Tuckcross 533	51.37	a*
Tuckcross M	50.18	a b
Tuckcross 520	49.88	a b c
Tuckcross V	49.25	a b c d
Tuckcross O (Dr. Lambeth)	48.82	a b c d e
Michigan-Ohio WR-3	48.00	a b c d e f
Tuckcross W	46.28	a b c d e f g
VH 651	45.33	b c d e f g h
T 27 BA	45.00	b c d e f g h i
VH 653	44.92	b c d e f g h i j
Eureka #206	42.73	g h i j k
VH 631	42.48	g h i j k l
Michigan-Ohio	41.30	g h i j k l m
VH 646	40.23	h i j k l m n
Spartan 8	40.00	h i j k l m n p
VH 634	38.95	k l m n p
Spartan 10	38.73	k l m n p
Y 67	37.83	k l m n p
Vantage	36.98	m n p
Ohio WR-7	36.35	m n p
Vendor (Vineland)	36.20	m n p
Vendor (Stokes)	36.12	m n p
V 6728	34.72	p
Tuckqueen	34.17	

* Any two means not followed by the same letter are significantly Different at P = 0.05 level.

1. Tuckcross 533, Tuckcross M, Tuckcross 520, Tuckcross V, Tuckcross O (Dr. Lambeth), Michigan-Ohio WR-3, and Tuckcross W are the top seven varieties in total yield, not differing significantly from one another but significantly superior to VH 646 and others below it in the list.
2. Tuckcross 533 was significantly superior to VH 651 and all the rest below it.
3. Average total yield per plant 10.3 pounds.

TABLE 5. MEAN YIELD OF THREE VARIETIES OF TOMATOES (TUCKCROSS, MICHIGAN-OHIO, TUCKQUEEN) IN KILOGRAMS, FALL CROP 1968.

Greenhouse	Mean Total Yield in Kg.	
Fibreglass	15.76	a*
But Glass	14.89	a b
Mylar	14.38	a b c
Lap Glass	14.30	a b c d
UV-4	12.61	c d e
PVC	11.83	e

* Any two means not followed by the same letter are significantly different at P = 0.05 level.

1. The Fibreglass greenhouse gave the highest total yield and differed significantly from the UV-4 and PVC greenhouses.
2. NO significant differences in total yield among the Fibreglass, But Glass, Mylar and Lap Glass greenhouses.

TABLE 6. MEAN YIELD OF TWENTY-FOUR VARIETIES OF TOMATOES (SIX GREENHOUSES IN KILOGRAMS, FALL CROP 1968.

Tomato Varieties	Mean Total Yield in Kg.	
Tuckcross O	19.37	a*
Hybrid 533	18.27	ab
Super M	18.12	abc
Tuckcross K	17.55	abcd
Tuckcross 533	16.87	bcde
Hybrid 549	15.67	ef
T 27 BA	15.61	efg
Tuckcross 520	15.48	efgh
Tuckcross 519	14.78	fghi
Ohio WR-25	14.77	fghij
682715 - BK	14.61	fghijk
Hybrid 418	14.33	fghijkl
Ohio WR-29	14.30	fghijklm
Mich-Ohio Hybrid	14.23	fghijklmn
HO 1343	13.67	fghijklmno
Vendor	13.50	ghijklmnop
Ohio WR-7	13.15	hijklmnopq
Spartan 10	13.10	hijklmnopqr
Spartan 8	12.88	hijklmnopqrs
HO 1342	12.20	nopqrst
Moto-Red	10.98	stu
Tuckqueen	10.80	stu
BV. 732-2050	6.33	v
BV. 732-2709	4.48	w

* Any two means not followed by the same letter are significantly different at P = 0.05 level.

1. Tuckcross O gave highest total yield and did not differ significantly only from Hybrid 533, Super M and Tuckcross K.
2. The 4 varieties - Tuckcross O, Hybrid 533, Super M and Tuckcross K - were superior to Hybrid 549 and the other 18 lower yielding varieties.
3. Average total yield per plant 3.6 pounds.

TABLE 7. MEAN TOTAL YIELD IN KILOGRAMS OF TWENTY-FOUR VARIETIES OF TOMATOES, SPRING CROP 1969.

Greenhouse	Mean Total Yield in Kg.	
Fibreglass	49.35	a*
But Glass	47.49	a b
Mylar	45.26	a b c
PVC	44.90	a b c d
Lap Glass	43.98	a b c d e
UV-4	36.5	f

* Any two means not followed by the same letter are significantly different at P = 0.05 level.

1. The Fibreglass, But Glass, Mylar, PVC and Lap Glass greenhouses are not significantly different from each other in total yield.

2. The UV-4 greenhouse gave the lowest total yield and it was signicantly lower than all the others.

TABLE 8. MEAN TOTAL YIELD IN KILOGRAMS OF TWENTY-FOUR VARIETIES OF TOMATOES, SPRING CROP 1969.

Tomato Varieties	Mean Total Yield in Kg.	
Michiana #138	57.80	a*
Tuckcross O	56.42	ab
Michigan-Ohio 3	56.41	abc
Tuckcross 520	55.92	abcd
Tuckcross M	54.63	abcde
Veegan	53.56	abcdef
Michigan Ohio	50.44	defg
Tuckcross 533	49.02	efgh
Hybrid 549	47.62	ghi
Eurocross	47.60	ghij
Tuckcross V	47.40	ghijk
J 358	43.10	hijkl
V 6815	42.84	ijklm
OP 5	42.17	ijklmn
Selsey Cross	41.53	lmno
J 353	40.04	lmnop
Ohio WR7	39.93	lmnopq
Tuckqueen	39.89	lmnopqr
Vinequeen	38.31	lmnopqrs
Hybrid 418	36.77	nopqrst
J 359	36.03	opqrstu
Kingley Cross	35.41	pqrstuv
Vendor	31.69	tuvw
GCR 89	25.34	w

* Any two means not followed by the same letter are significantly different at P = 0.05 level.

1. Michiana #138, Tuckcross O, Michigan-Ohio 3, Tuckcross 520, Tuckcross M and Veegan are the top 6 varieties in total yield, not differing significantly from one another but significantly superior to Hybrid 549 and others below it in the list.
2. Michiana #138 was significantly superior to Michigan Ohio and all the others below it.
3. Average total yield per plant was 10.9 pounds.

TABLE 9. MEAN TOTAL YIELD IN KILOGRAMS OF EIGHTEEN VARIETIES OF TOMATOES, FALL CROP 1969.

Greenhouse	Mean Total Yield in Kg.	
Fibreglass	22.37	a*
But Glass	19.86	b
Lap Glass	16.37	c
Poly vinyl chloride (rigid)	14.26	d
UV-4	12.44	d e
Fulcon	11.67	e

* Any two means not followed by the same letter are significantly different at P = 0.05 level.

1. Fibreglass greenhouse gave the highest total yield and differed significantly from all the other greenhouses.
2. There was no significant difference in yield between PVC and UV-4 and between UV-4 and Fulcon.

TABLE 10. MEAN TOTAL YIELD IN KILOGRAMS OF EIGHTEEN VARIETIES OF TOMATOES, FALL CROP 1969.

Tomato Varieties	Mean Total Yield in Kg.	
Super M	19.04	a*
Tuckcross K	18.58	a b
Tuckcross O	18.34	a b c
Michiana #138	17.81	a b c d
Tuckcross 520	17.79	a b c d e
Hybrid 575	17.34	a b c d e f
Ohio Wr 29	17.01	a b c d e f g
Veegan	16.52	b c d e f g h
Hybrid 665	16.45	b c d e f g h i
Michigan Ohio 3	16.32	b c d e f g h i j
Hybrid 418	16.16	c d e f g h i j k
Hybrid 549	15.51	d e f g h i j k l
Michigan Ohio	15.07	f g h i j k l m
Eureka 270	14.61	h i j k l m n
Ohio WR 25	14.48	h i j k l m n o
Kvithamar	14.12	i j k l m n o p
Ar King	14.02	j k l m n o p q
Tuckqueen	11.76	r

* Any two means not followed by the same letter are significantly different at P = 0.05 level.

1. Super M gave the highest total yield and did not differ significantly from Tuckcross K, Tuckcross O, Michiana 138, Tuckcross 520, Hybrid 575 and Ohio WR-29.

2. The seven varieties Super M, Tuckcross K, Tuckcross O, Michiana 138, Tuckcross 520, Hybrid 575 and Ohio WR-29 were superior to Eureka 270 and all other lower yielding varieties.

3. Average total yield per plant was 3.0 pounds.

Tomato Varietal Trial

A separate varietal trial was conducted in the fall of 1968 in one of the maintenance greenhouses which is covered with Fulcon. Varieties not previously tested were grown and the results of this trial are given in Table II.

TABLE II. MEAN TOTAL YIELD IN KILOGRAMS OF TEN VARIETIES OF TOMATOES IN THE FULCON GREENHOUSE, FALL CROP 1968.

Tomato Varieties	Mean Total Yield in Kg.	
Kvithamar	22.44	a*
Eurocross	21.66	a b
Warecross	21.55	a b c
F_1 Hybrid MM	21.48	a b c d
Vinequeen	19.23	a b c d e
Market Queen	19.08	a b c d e f
#22	18.75	a b c d e f g
#54	15.54	e f g h
Moneymaker	14.88	e f g h i
Carored	4.00	j

* Any two means not followed by the same letter are significantly different at P = 0.05 level.

1. Kvithamar, Eurocross, Warecross, F_1 Hybrid MM, Vinequeen, Market Queen and #22 did not differ significantly among themselves in total yield in the Fulcon greenhouse.
2. Kvithamar, Eurocross, Warecross and F_1 Hybrid MM yielded significantly higher total weight of tomatoes compared to #54, Moneymaker and Carored.
3. Carored was the lowest yielder and was significantly lower than all the other cultivars tested in the Fulcon greenhouse.

Water Requirements of Greenhouse Tomatoes - D.L. Douglas, J. Kelly

A project has been set up by using tensiometers to detect soil moisture in order to determine the best irrigation schedule for greenhouse tomatoes grown in ground beds. This program was set up in the fall of 1969 with the cooperation of the Water Resources Division, Alberta Department of Agriculture. Interest is in watering schedule as it relates to blossom-end rot.

Related and Service Functions

Herbarium and Insect Collections - G. Walker

Five hundred species of vascular plants including horticultural species varieties, and clones, noxious weeds, and our native flora have been collected to December, 1968 to be placed in the herbarium.

Collections of common insects and insects of economic importance in this area have also been collected and mounted.

INTRODUCTIONS

OLERICULTURE

"Globe Trotter Tomato" - B.V. 132 - 2109

Year Released - 1960
Parentage - Alred x Arche Wonder, F_6
Description - The plant habit is determinate, slightly on the indeterminate side. The fruits are smooth and large; diameters average 3 inches equatorial and 2 inches polarial. External color is medium red, internal color is medium red. There are some pink spots. Fleshy with many luculluses and with quite a few seeds. Acidity is very low. This is a very heavy yielder, very early, and an ideal commercial variety. It shows slight fasciations in some fruits.

"Red Bobs Tomato" - B.V. 132-2022

Year Released - 1960
Parentage - Alred x Arche Wonder, F_6, sister selection of the Globe Trotter.
Description - The plant habit is determinate. The fruits set in compact cluster, are smooth, uniform and resistant to cracking. Medium in size, dark red in color, without lighter spots. The flesh is palatable, slightly more acid than Globe Trotter. It is a heavy yielder, very early and an ideal home garden variety or for adaptation to the tube trade.

"Brookpack Tomato" - B.V. 132-2050

Year Released - 1970
Parentage - Alred x Best of Bown A
Description - The plants are determinate, moderately vigorous with medium foliage growth. They set fruit under cool night temperature conditions, and produce heavy clusters of 5-7 early ripening fruits.

The fruits are uniform, medium in size, between 4 to 6 ounces in weight, very smooth, globe to slightly oblong in shape. Both the external and internal color is a rich red. The stem attachment is small and the removal of the calyx does not tear the flesh. The blossom end is very small and always perfectly smooth. Average yield per plant is over 8 pounds, and 80 per cent of the total crop can be harvested in two harvests.

"Brookpact Tomato" - B.V. 132-2109 GTD

Year Released - 1970
Parentage - A cross between the Alred and Cloche Wonder produced this sport in its F_9 generation in 1965.

Description - It is an entirely new type of plant, dwarf, moderately erect with vigorous foliage, and after setting 5 to 8 clusters it terminates its own growth. Rolling of the leaves is characteristic at maturity. The size of plant is about 12" both in width and in height making possible a very high plant population. It sets fruit under cool night temperature conditions. The yield is over 8 pounds per plant and 80 per cent can be harvested in one harvest. The small plant size, upright growing habit and concentrated ripening makes it suitable for mechanical harvesting. These characteristics are dominant, therefore it can be very useful in breeding programs for mechanical harvesting. They produce heavy clusters of an average 5 early ripening large fruits. The fruits are round to flat-round, very fleshy, smooth, averaging 6 to 9 ounces with a bright red color.

"Castle Pepper"

Year Released - 1968
Parentage - Keszthelyi x Cecei
Description - The plants are of medium size with small leaves and light foliage. Side branches break easily with careless harvesting.

Fruits are light waxy yellow in color when ready for flesh use and light red in their fully ripe stage. Fruits are pointed, 3 to 5 inches long and 2 to 3 inches wide. The flesh is thick, juicy with a very mild sweet flavor. Popularity is increasing due to its high culinary quality.

Early, Heavy yielder.

POMOLOGY

B.F. 1 - Brooks Sandcherry

The variety was introduced by the late Mr. G.F. Chipman and the present selection represents the fourth generation. First introduced to the Prairies in 1933. Prolific bearer, hardy and early ripening. Fruit size 7/8" by 1/8". Oval shaped. Thin skin, firm flesh, juicy and a very good canner. Very satisfactory for the northern parts of the prairies.

B.F. 2 - Prunus tomentosa hybrid

This is an open pollinated seedling. Bush is hardy, and grows to five feet. Fruit brownish red, firm and flowers pinkish white. Introduced in 1929.

B.F. 3 - ("Sapalta") Cherry Plum Hybrid

Originally from Valley City, North Dakota. Probably a budsport of Sapa. Fruit quite similar to Sapa but tends slightly towards freestone with lighter color of seed upon opening the fruit. Seed generally somewhat smaller than Sapa with a distinct ridge on both sides of the seed not found on Sapa. Slightly hardier than Sapa and fruit will withstand wet weather without the skin breaking. Fruit size 1 1/8" by 1". Sweeter than Sapa.

B.F. 9 - Crab Apple

Open pollinated Dolgo seedling found in a group originating in Morden, Manitoba in April 1929. Tree is a hardy upright grower. Fruit has a yellow background overlaid with a red blush and pencilled with streaks of deeper red. Fruit is flat with deep calyx and stem cavities. Stem end russeted. Firm flesh, quite dry, thin skin but does not bruise easily. Good quality. S ize 2" diameter.

B.F. 10 - Crab Apple

Open pollinated Dolgo Seedling originated at the C.P.R. Demonstration Farm, Brooks (Alberta Horticultural Research Center) in 1927. A hardy bushy type tree. Fruit medium to large. Size 1 3/4" diameter. Green color overlaid with deep bronze stem cavity deep with long, slender stem. Shallow, small calyx. Medium flat shape. Flesh firm and juicy with tough skin. Good quality.

B.F. 40 - Prunus salicina (Manchurian Plum)

Seedling selected from original seed sent to the Research Center, Brooks, by L.V. Ptitsin of Harbin, Manchuria. Very vigorous tree. Blooms and ripens early. Dark green fruit with a reddish-purple overlay. Flesh is green, firm. Size slightly larger than Opata. Very palatable and tender when cooked.

B.F. 14 - Apple

Parentage unknown. Seed received from Morden, Manitoba and planted in trial plots in 1929. Tree is hardy, tall and upright. Fruit flat shaped. Size 2½" diameter. Colour cream background overlaid with bright, pinkish red stripes. Stem cavity medium deep, calyx cavity shallow and inconspicuous. Flesh crisp, juicy, fine grained. Skin tough. Good quality.

B.F. 24 - Cherry Plum Hybrid

Opata seedling. Very hardy and productive. Fruit 1" in diameter, dark purplish red with blue bloom. Early bearing. Fruit good and sweet. Good for dessert and canning.

B.F. 26 - Apple Crab

Open pollinated Anoka seedling originated at the C.P.R. Demonstration Farm, Brooks (Alberta Horticultural Research Center) in 1933. Hardy, dwarf spreading tree. Fruit yellow background, heavily striped with red. Round and flat with five inconspicuous ribs. Stem cavity deep; short stem. Calyx small; shallow. Size 1 3/4" diameter. Flesh medium coarse, creamy color. Skin medium coarse and does not bruise. Good quality and good to eat out of hand.

B.F. 27 - Apple

Unknown origin. Original planting at C.P. R. Demonstration Farm, Brooks (Alberta Horticultural Research Center). Introduced in 1937. Hardy plant. Fruit 2½" in diameter, keeps well in storage, pleasant eating and a good cooking apple. Greenish colour with attractive red overlay. Good quality.

B.F. 36 - "Albol" Currant (Ribes odoratum)

Collected plants from Colorado were grown by Mr. Bolinger of Gleichen, Alberta. A large collection of the original plants were grown at the Alberta Horticultural Research Center, Brooks. Two selections known as "Albol" black and "Albol" yellow have been selected and distributed widely. Plants are drought resistant, vigorous, tending to sucker and prolific producers of large, mild currants. Their attractive, golden yellow aromatic flowers, long racemes of richly colored fruit and the brilliant hues of autumn foliage also make them attractive ornamentals.

B.F. 41 - Prunus salicina (Manchurian Plum)

Origin similar to B.F. 40. Tree is moderately vigorous and medium in size. Blooms and ripens early. Fruit is golden yellow, free stone, tender skinned and highly palatable fresh and cooked.

B.F. 58 - Prunus salicina

Seedling of Ivanovka parentage. Seed collected at the Research Station, Morden. Introduced in 1962. Tree is very hardy and a vigorous grower. Fruit dark red. Good to eat out of hand and cooks well.

B.F. 70 - Prunus salicina

Prunus salicina Yellow Mandarin seedling from Morden, Manitoba. Hardy, medium sized, upright tree. Fruit golden yellow, free stone, medium sized. Good eating out of hand. Not good cooked.

B.F. 90 - Prunus salicina

Seedling of Ptitsin parentage from Morden, Manitoba. Medium sized, hardy tree. Large, yellow, fruit, free stone. Good eating out of hand. Not good for cooking.

B.F. 86 Prunus salicina hybrid

Seedling from Morden, Manitoba. Vigorous, hardy, well formed tree. Fruit 1½" diameter, round shaped. Fruit dark red in color with blue bloom. Very good out of hand, good cooked and makes very good jam.

B.F. 188 - Apple (Heyer No. 12 x Dr. Bill)

Medium sized, hardy, vigorous tree. Good strong crotches. Early bloom and ripening. Fruit 3" plus in diameter. Pale yellow background with red washed and darker red streaks. Good quality, however does not store well.

ENVIRONMENTAL HORTICULTURE

Ornamentals

These are mainly selections of suitable native material made by the late Mr. A. Griffin, Regional Engineer with C.P.R. and Mr. P.D. Hargrave, former Superintendent of the Alberta Horticultural Research Center.

B.O. 1 - Shepherdia argentea 'Goldeye' (Yellow Buffaloberry)

A yellow-berried sport of Shepherdia argentea. The first plants collected and planted here were found on the banks of the Red Deer River by the late Mr. A. Griffin. Collections were made in 1918 and 1923.

A very hardy tree, makes a good hedge and a background specimen in the fifteen-foot class. Flowers are yellowish and fruit bright yellow.

B.O. 2 - Amelanchier alnifolia 'Altaglow' (White Saskatoon)

A white-fruited sport of Amelanchier alnifolia. The first plants grown here were collected on the banks of the Red Deer River. The second lot was collected north-west of Edmonton. These collections were made from 1918 to 1923 by A. Griffin. They are hardy but not as prolific as the black-berried Saskatoon. Makes good windbreak and can find its place in landscaping. Fall foliage color is distinctive. Fruit will jell.

Plants have been distributed over a wide area and reports have been favorable.

B.O. 3 - Philadelphus lewisii 'Waterton' (Waterton Mock Orange)

One of the hardiest specimens of Mock Orange we have in the West. Although the flowers lack fragrance, the size and quantity of bloom more than balance the loss of aroma. The parent plant was collected in Waterton National Park near the lake, hence the name. It grows to a height of three to five feet and makes a splendid ornamental with its white blooms. Collected by Mr. A. Griffin.

B.O. 5 - Malus 'Strathmore' (Strathmore Rosybloom Crabapple)

Tested as A1-14 - A-11. A seedling of Brooks Fruit #6 Malus 'Jubilee' which itself is a seedling of Malus 'Hopa' grown at our sub-station at Strathmore. Seed of this tree was produced at Strathmore and the seedlings planted in a windbreak. It was selected in 1941 by Mr. W.R. Leslie, former Superintendent of the Dominion Experimental Station, Morden, and Mr. A. Griffin. This tree has very dark foliage and is hardy. It has a pyramidal type of growth, with fine willowy branches. A good foreground ornamental.

The fruit is small and almost round, cherry red ground color, overlaid bluish red, very small dimples, and small inconspicuous slate color dots. Stem cavity very shallow with long slender stem. Calyx very shallow, wide and open. Flesh very firm and bright red. Skin thin and fairly tough and does not bruise easily. Quality very good for jelly making.

Listed in:
1) Arnoldia, Vol.19, No. 4, April 24, 1959. "CrabApples of Merit".
2) American Nurseryman, May 1, 1959. "Choosing Among the Crap Apples", by Donald Wyman. In this it is referred to as the Strathmore (Pillar of Fire) purplish-red flowers, purplish fruit, foliage other than light green, mostly reddish-green to bronze. Habit upright. Flowers fade less than Hopa.

B.O. 6 - Prunus pensylvanica 'Liss' (Pincherry)

Received as a plant in May 1937 from Mr. John Liss of Sangudo, who found it in a natural planting. He has it under cultivation.

It fruited at the Center in 1940 and because of its size attracted attention. The fruit was picked on August 9th during a visit of Mr. A. Griffin and was compared with the common Pincherry. The fruit weighs slightly over 700 mgs. as compared to that of the common pincherry grown at the Center which weighs 225 mgs. In flavour it is pleasant and the skin is thin and tender. The fruit is slightly larger than that of the Jumping Pound Pincherry.

The tree is upright, forming a sturdy trunk, and to date has not suckered.

B.O. 7 - Prunus pensylvanica 'Jumping Pound' (Jumping Pound Weeping Pincherry)

This plant was secured in May, 1936 from the Jumping Pound district in the foothills about 30 miles (westerly) from Calgary in a locality where Pincherries are not common. It was taken from a vertical crack in a rock on top of a dry ridge, and was transplanted to Strathmore.

It thrived and bloomed freely in 1936 and succeeding years. It is definitely weeping type with long, slender pointed leaves. It is self sterile and did not fruit until 1940 when other pincherry pollen was available. Fruit began to ripen with the earliest of the sandcherries and was all picked on August 4th. The fruit is quite round, a little broader than it is long. Individual fruits measured up to 7/16 inch in diameter. This size compared to 1/4 to 5/16 inch for other pincherries which makes it 3 to 5 times as large. The entire run-of-tree crop weighed at the rate of 506 per pound. Run-of-tree picking from three ordinary pincherry trees bearing the largest fruits weighed at the rate of 1075 per pound or a little less than 1/2 the average weight for the Jumping Pound fruits.

The Jumping Pound Pincherry flowers profusely with much the appearance of the Spirea "Bridal Wreath".

Potentilla Collection

In 1958 Mr. P.D. Hargrave made a collection of Potentilla in the Cypress Hills at an elevation of 5000 feet. Seven of these plants have been selected for their dwarf characteristics.

Banff Juniperus Collection

Forty-eight specimens of Juniperus from the Banff area were collected under the direction of Mr. R. Almey in November 1959. Thirty-five of these have been re-established in a field test. The plants were collected at an elevation of 4583 feet.

Juniperus communis depressa 'Cluny #1'

This is a native of Cluny, Alberta and was collected by Mr. P.D. Hargrave in 1959. It is an upright from up to 36 inches. Dense and spreading. To be introduced as the variety 'Crowfoot'.

Juniperus horizontalis 'Cluny #2'

This is a native of Cluny, Alberta and was collected by Mr. P.D. Hargrave in 1959. Retains its color well.

Juniperus horizontalis 'Cluny #3'

This is a native of Cluny, Alberta and was collected by Mr. P.D. Hargrave in 1959. It is dwarf and does not spread extensively. From the centre (witch's broom) of Cluny #2.

B.T. #1 - Populus 'Griffin' (Griffin Poplar)

Hybrid Poplar (P. deltoides x P. petrowskyana)

The female parent in this cross was a seedling of the cottonwood P. deltoides taken from a sand bar in the Red Deer River in 1918.

The male parent was the Russian poplar P. petrowskyana. The seed was produced in 1927 and seedlings were grown to maturity before final selections were made. Only male plants were retained. Originally 10 selections were made and from this group 6 were re-selected. 'Griffin' poplar was the first selection made.

Typical specimens are columnar with ascending branches. Retest trees at twenty years of age are 35 to 40 feet in height. Branches slightly angular. Bark Carnation Green 0058/1, buds Spanish Orange 010, Viscid. Leaves lanceolate ovate, serrate, cuneate, acute, glabrous, usually one gland. Hardy into Peace River area, but usually recommended for the southern part of the province.

Plants touch when planted 4½ to 5 feet apart, thus making good shelterbelt trees. It appears to be resistant to poplar gall mite.

This tree is, however, weak rooted. It requires moisture and therefore is not useful in dry or non-irrigable areas. In more humid climates (Manitoba and East Central States) this tree is troubled with pests and diseases.

B.T. #4 - Populus 'Brooks #4'

Brooks #4 is a tall, spreading poplar, which is resistant to poplar gall mites. It holds its leaves well into the fall. The scarlet colored male catkins are particularily striking in the spring.

B.T. #6 - Populus 'Brooks #6'

Brooks #6 is a tall upright tree with rough bark, somewhat larger than Brooks #2. It carries its leaves fairly late in the year. No gall mites have been found on this clone to date.

B.F. #4 - Malus 'Alred' (Alred Rosybloom Crabapple)

Originated at the Alberta Horticultural Research Center, Brooks, Alberta and introduced in 1937. Open-pollinated seedling of Malus pumila var. niedzwetzkyana x Malus baccata. Sent out under test as A1-14-B-4.

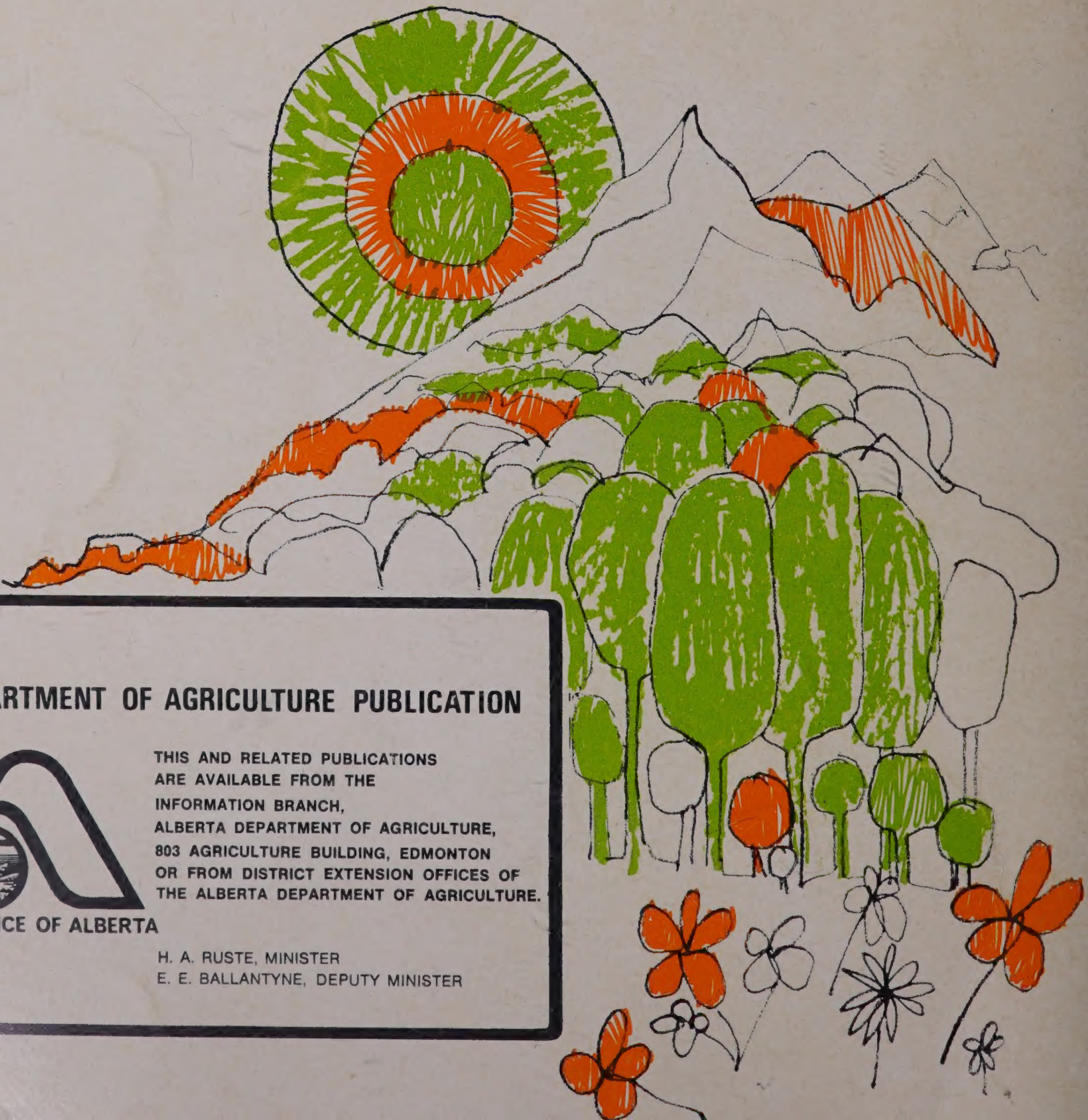
Blooms are large, red in color and of #3 intensity. Fruit is small, dull red, with a few scattered white dots. Suitable for jelly.

The tree is open with strong branches, good crotches, and spreading type. Dark metallic blue-grey color of bark adds to attractiveness. Makes a good foreground ornamental. Lenticels are long and narrow; distinct on young wood; vigorous grower; very hardy.

B.F. 6 - Malus 'Jubilee' (Jubilee Rosybloom Crabapple)

Tested under A1-14-A17. Hopa crab seedling open pollinated cross of Malus pumila var. niedzwetzkyana x Malus baccata. Originated at the Research Center, Brooks, Alberta. Seed sown in the fall of 1927 and planted in trial plots in the spring of 1929. Fruit is small and almost round. Color faint yellow ground overlaid light red and with very small light slate colored dots. Stem cavity very shallow; stem long and light red color. Calyx cavity very shallow with large calyx. Flesh very firm, pale red throughout. Skin thin but tough. Quality very good for jelly making.

This tree is somewhat open branched. Hardier than Alred and parent Hopa. Bloom is #1 intensity. Deepest color of all the reds. First distributed by the Research Center in the fall of 1937. Named 'Jubilee' in 1955.



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